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EDITED BY

F. J. CHITTENDEN, F.L.S., V.M.H. & Rev. W. WILKS, M.A., V.M.H.

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REV. W. WILKS, M.A., V.M.H.

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Volume XLVI. has been issued in one part, containing the 'Journal' proper, paged with Arabic figures, and 'Extracts from the Proceedings,' paged with Roman figures.

JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. XLVI. 1921.

AN ACCOUNT OF THE GENUS SEDUM AS FOUND IN CULTIVATION.

By R. LLOYD PRAEGER, B.A.

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PART I.—INTRODUCTORY.

I. PRELIMINARY.

It is doubtful if any genus of plants which is widely cultivated is in such a confused state in our gardens and horticultural books as is the genus *Sedum*. Even in collections where the owners pride themselves on correctness of nomenclature, misnomers and *nomina nuda* abound; and common species masquerade under many different names.

This does not arise from any special difficulty in the identification of the species of *Sedum*. Some of the species, it is true, are variable and in some of their forms not at once recognizable by the uninitiated ;

but the majority are stable and distinct plants recognizable at a glance, and more easily diagnosed than, for instance, the Saxifrages, which nevertheless, in gardens, are usually more correctly named.

The confusion among the Sedums appears to be due mainly to the fact that some of them are rampant growers which invade the territory of neighbouring plants and overwhelm them. In nurseries this undoubtedly leads to the intruders being sent out sometimes under the names of the species which they have ousted. The smallest scrap of many of these plants—in many cases single leaves—will take root and grow, and thus pieces accidentally dropped or carried by wind or other agencies may establish the species at a distance from the parent. Again, some of the species of the *rupestre* group, notably *S. altissimum* and *S. Douglasii*, have a habit of dropping in autumn numerous short barren shoots, which are rolled about by wind and so on, and take root wherever they find a refuge. There is little doubt that these facts go far to account for the numerous names under which common free-growing Sedums, such as *album*, *acre*, *sexangulare*, *reflexum*, *rupestre*, *anopetalum*, *altissimum*, and *spurium* are found in gardens. But a large number of misnomers are due to mere carelessness.

Another regrettable feature as regards the Sedums is the number of *nomina nuda*—names which belong to no described species—which are found in connexion with them. Many nurserymen's catalogues are full of such names. Some are clearly perversions, due to carelessness, of well-known names—such, for instance, are *crimea-lense* for *himalense*, and *glaciale* for *gracile*; but the majority seem to be deliberate unlicensed christenings. I have given elsewhere* a list of such of these as I have encountered—and suffered from—and it is to be hoped that they will disappear from our catalogues. Many of them have not even the merit of being applied consistently to any one species.

Another cause of misnaming among the Sedums is the fact that, like most succulents, these plants dry very badly, often losing all their leaves in the process, and unless killed with boiling water continuing to grow for weeks while being pressed; herbarium material is thus generally poor and unsatisfactory, often almost useless for comparison with the living plants, and identification is rendered correspondingly difficult. Figures of the species thus assume a special value, and many of the Sedums found in cultivation have never been drawn, while figures of many others are found only in publications inaccessible to the majority of gardeners. For this reason I have been at pains to have a drawing made by Miss Eileen Barnes of every species of which I could obtain fresh material. The descriptions likewise have in every instance where fresh material could be obtained been taken from the plants themselves, and checked with the descriptions given by the original describer and by leading authorities.

* *Gardeners' Chronicle*, 3rd Ser., 56, 334, 1914.

The cases in which the descriptions or figures are in whole or part not drawn from living material may be summarized as follows :

Fresh material not available—

S. rubricaulle, *S. Hemsleanum*, *S. japonicum*, *S. Zentaro-Tashiroi*.

Plants which have not flowered with me, or which died before flowering :

S. chapalense, *S. cyaneum*, *S. dendroideum*, *S. frutescens*, *S. Hallii*, *S. lenophylloides*, *S. oaxacantum*, *S. polyrhizum*, *S. trulipetalum*.

Description helped out by dried material :

S. Cockerellii, *S. glabrum*, *S. purpureoviride*, *S. Stevenianum*.

With the design of helping those to whom the technical terms of descriptive botany are unfamiliar, I have prefaced the description of each species with a brief note of the characteristics by which it may be distinguished from its nearest allies. I would like to warn readers that reliance on the figures alone may sometimes lead them astray in a genus so large and complicated ; even if the full description of the plant is not used, a careful study of the short note mentioned is quite necessary if pitfalls are to be avoided.

II. HISTORICAL.

As might be expected in a genus of which a number of species, of sufficiently noteworthy appearance, grow in regions associated with early civilizations, species of *Sedum* were known to the ancient naturalists (e.g. *S. Cepaea*, *S. maximum*, *S. roseum*), being referred to by Greek and Latin writers ; these and others were likewise known to the medieval herbalists. Coming to the dawn of modern botany, we find 15 species enumerated in the first edition (1753) of LINNAEUS' "Species Plantarum," all of these being European except *S. Aizoon* and *S. hybridum* (both Siberian) and *S. verticillatum* (Japanese, &c.). In the 4th edition (1799) of the same work the number has risen to 29, mainly by the addition of other European species. In 1828 DE CANDOLLE ("Prodromus," 3, p. 401) enumerates 88 species of *Sedum*, some of them tentatively as *non satis nota*, but almost all now recognized as good species. DE CANDOLLE's list includes a good many additions from the Caucasus, a few from Siberia, the Himalayas, Japan, North Africa, the United States, and Mexico, and one each from Madeira, Ecuador, and Venezuela. In 1862 BENTHAM and HOOKER ("Genera Plantarum," 1, p. 660) put down the number of known species at 120. This total is increased to 130 in standard works published during the next ten or twenty years, and this figure is raised only to 140 in such standard recent works as ENGLER and PRANTL, "Naturliche Pflanzenfamilien," iii. a (1891)

and DALLA TORRE and HARMS, "Genera Siphonogamarum" (1901). But as a matter of fact, the number of known species has increased far faster than that. In "Index Kewensis" (1885) some 238 species are listed (some of which are now regarded as synonyms or varieties); the four supplements which have since appeared raise this number (up to the end of 1910) to 391; and a fair estimate would put the total number of species at present known at about 500. The large increase during the last half-century is due mainly to the botanical exploration of Mexico and of Western China (see pp. 8, 10).

The great majority of these 500 species are not, and have never been, in cultivation, and are known (especially the many recently described Chinese species) only from dried specimens. A good many of them are annuals, or of no horticultural value. But there remain many handsome or interesting plants, which one would like to see introduced into our collections. As regards the number of species in cultivation, Dr. MAXWELL MASTERS, in his account of the cultivated Sedums* (1878), lists 65 species; but a critical examination of his list shows that of these only 44 were certainly examined by himself, or, if not seen, were certainly correct. These are all in cultivation still. Four more were apparently seen by him. Eleven not seen by him I regard as doubtfully correct, and probably referable to species already in his list, while finally six of his species are now to be set down as synonyms, additional species erroneously named, or varieties. These last are:

- | | |
|------------------------|--|
| <i>S. arboreum</i> | = <i>S. moranense</i> var. <i>arboreum</i> . |
| <i>S. Beyrichianum</i> | = <i>S. Nevii</i> var. <i>Beyrichianum</i> . |
| <i>S. Maximowiczii</i> | = <i>S. Aizoon</i> . |
| <i>S. pruinatum</i> | = <i>S. rupestre</i> . |
| <i>S. sarmentosum</i> | = <i>S. mexicanum</i> . |
| <i>S. stoloniferum</i> | = <i>S. spurium</i> . |

As the first, fifth, and sixth of these are not in his list under their correct names, the number certainly in cultivation, according to his paper, is raised to 47. At least half a dozen tender species (with which his paper was not concerned) were also certainly in cultivation at that time.

As regards the present list, I went further afield than Dr. MASTERS, and to the best of my ability ransacked the gardens of the world, till the war put an end to such activities. European gardens yielded a good many species unknown to MASTERS; others came from the Himalayas, China, and Japan, while important contributions of Mexican species were received from Washington and New York. As a result I have received and grown a total of 151 species, 13 of which proved to be new to science, and have been described.† I know of only four species which I believe to be at present in cultivation,

* MASTERS, M. T., "Hardy Stonecrops: Sedums." *Gard. Chron.* N.S. 10, 1878, ii.

† *Journal of Botany*, vols. 55, 56, 57.

which I have not seen—*S. rubricaula* at Washington, *S. Hemsleanum* at St. Louis, and *S. Zentaro-Tashiroi* and *S. japonicum* (var. *senanense*) at Tokio. Some other species were in cultivation not many years ago—for instance, *S. clavifolium*, *S. delicatum*, *S. filiferum*, *S. Painteri*, *S. semiteres*, *S. submontanum* at Washington, and *S. Englerianum* at Dahlem, but they appear to be now lost.

Some details as to the sources from which the species described in the following pages were derived will be found on p. 19.

In addition to species already in cultivation, some species hitherto unknown in gardens were introduced, thanks to the kind offices of correspondents in Asia and America; and a few others which had been lost to cultivation, such as *S. pruinatum* from Portugal and *S. lancerottense* from Teneriffe, were reintroduced and distributed.

III. DISTRIBUTIONAL.

The genus *Sedum* is spread in varying abundance throughout the Northern Hemisphere. The majority of the species inhabit temperate countries, or, if found in lower latitudes, have their homes on the mountains, so that most of them are hardy in our gardens. A few species run very far north, and the genus is represented in Iceland, Nova Zembla, Arctic Siberia, Alaska, and Greenland; these northern forms belong mostly to the section *Rhodiola*. Southward, a few endemic species are found in the Philippines; others reach the Equator on the great mountains of Central Africa; while in America the genus has spread down the backbone of the continent and has crossed the Equator, the most southern outpost being in Bolivia. Over part of its wide range, the genus exhibits well-marked geographical groups, allied species being concentrated in particular areas—for instance, the large *Rhodiola* group in Asia from the Himalayas to China, the *Involucrata* group in the Caucasus, the *rupestre* group in Europe; on the other hand, the rich *Sedum* flora of Mexico shows extraordinary variety of forms mostly without close relationship. The succeeding paragraphs briefly describe the *Sedum* flora of the main areas occupied by the genus; on pp. 22, 23 will be found notes as to the distribution of the phylogenetic groups into which the genus divides itself.

Europe.

About sixty species of *Sedum* altogether occur in Europe, the number increasing generally from the north-west to the south-east. The great bulk of these are representatives of the section *Seda Genuina*—mostly small creeping plants with very thick leaves, and yellow or white flowers. Among them, the well-marked *Rupestre* group is characteristically European. About one-third of the total are annual plants; these are mostly southern, and increase eastward to find their maximum in the region extending from Greece to Persia. Of other sections of the genus, three *Telephiums* occur—*S. Telephium*,

S. maximum, and *S. Anacampseros*, and one *Rhodiola*, the ubiquitous *S. roseum*—if we except *S. quadrifidum*, which spreads from Arctic Asia just into Russia. Almost all the perennial species are in cultivation, though in some cases very rarely; a few Balkan and Greek plants are yet unknown in gardens. Some of the annual plants are found in gardens, but the pretty blue *S. coeruleum* is the only one of value.

In our own islands eight species are undoubtedly native—namely, *roseum*, *Telephium*, *album*, *anglicum*, *acre*, *reflexum*, *rupestre*, *villosum*. Several others, such as *dasyphyllum* and *sexangulare*, are naturalized. Most of our native species have been spread by human agency much beyond their original native limits.

LITERATURE.—NYMAN, "Conspectus Florae Europae," and Supplements.

Africa.

The Mediterranean littoral yields a number of the familiar species of southern Europe, and also some endemic plants, such as *S. multiceps* (well known in cultivation) and the curious *S. tuberosum*. A few species occur on the mountains of Abyssinia, and one or two others have recently been discovered as far south as the Equator, on Mt. Ruwenzori. R. HAMET reduces* the nine species which have been described from the interior of Africa to five—namely, *abyssinicum* Hamet, *Meyeri-Johannes* Engler, *ruwenzoriense* Baker fil., *Epidendrum* Hochstetter, *sediforme* Hamet. None of these is known in cultivation.

The Atlantic Islands.

Madeira yields three species of *Sedum*—*S. farinosum* Lowe (possibly an extreme form of the European *album*) and two yellow-flowered species, *fusiforme* and *nudum*, apparently related to those of Central Africa and Central America. The Canaries possess *S. lancerottense* (closely allied to the Madeiran *nudum*) and the Mediterranean annual *rubens*; possibly also a third species undescribed (a poor specimen in Herb. Kew.). Of the above, *nudum* and *lancerottense* are in cultivation.

The Caucasus.

The Caucasian region is particularly interesting as being the headquarters of two very distinct sections of the genus—the group *Involucrata* of MARSCHALL VON BIEBERSTEIN, of which the familiar *spurium* is a characteristic example; and the still more distinct little group of the *Sempervivoides*. Most of these are confined to the Caucasus, but a few are found in the adjoining regions of Asia Minor or Persia. The *Involucrata* number half a dozen species, with roundish, flat, mostly opposite leaves and red or white flowers. Of these, *spurium* is very widespread in cultivation, with crimson, pink, or

* In litt., Herb. Brit. Museum.

white flowers; *stoloniferum* is less frequently seen in gardens, and *Stevenianum* and *proponticum* almost unknown. The remaining members of the group, *obtusifolium*, *Millii*, and *involutratum*, from the Caucasus, and *Baileyi* from China, are not, I believe, in cultivation. The *Sempervivoides* group includes two remarkable biennial plants, *S. sempervivoides* and *S. pilosum*, which form dense plump leaf-rosettes like those of the genus *Sempervivum*, and in their second year produce masses of showy red flowers. Both species are now well known in good collections. For the rest, the *Sedums* of the Caucasus region, which number some twenty in all, include a few familiar European species—*maximum*, *album*, *acre*, *sexangulare*—a few small perennials not found elsewhere—*gracile*, *tenellum*, and *subulatum*, the first of which is in cultivation—and some little annual species.

LITERATURE.—LIPSKY, "Flora Caucasica," 1899 (in Russian). HAMET, "Révision des *Sedums* du Caucase." *Trd. Bot. Sada, Tiflis*, 8, Part III., 1908.

NOTE.—Syria, Mesopotamia, and Persia yield a number of *Sedums*, mostly small annuals.

Siberia and Central Asia.

Just as the Caucasus region is the headquarters of the small and distinct group of *Sedums* of which the familiar *spurium* is typical, so we find focussed in Eastern Siberia and the northern parts of China and Japan a compact little group of thick-rooted, flat-leaved, yellow-flowered species—the *Aizoon* group. These include five—*Aizoon*, *Selskianum*, *hybridum*, *kamtschaticum*, and *Middendorffianum*—of which the first and third were known to LINNAEUS, and all have been long in cultivation; and the two more, *Ellacombianum* and *floriferum*, lately described by myself from living material. Only two of the group are not in cultivation—*S. Sikokianum* and *S. Yabeanum*, both of Japan. For the rest, the Siberian and Central Asiatic *Sedum* flora is made up mainly of plants of the *Rhodiola* and *Telephium* sections, many of which occur, some of them extending far to the northward. But the main centre of the *Rhodiola* section lies farther south, in the Himalayan region, and that of the *Telephiums* south-eastward, in China and Japan.

LITERATURE.—MAXIMOWICZ, "Diagnoses Plantarum Novarum Asiaticarum." *Bull. Acad. Impér. des Sciences de St. Pétersbourg*, 29, 1883. (Reprinted in *Mélanges Biologiques*, 11.)

The Himalayan Region.

The Himalayas are *par excellence* the headquarters of the *Rhodiola* section of *Sedum*; not that many species of that group are not found in neighbouring regions—e.g. Yunnan—but in the Himalayas the *Rhodiolas* are so abundant as to form a feature of the vegetation of the higher grounds, and only few other *Sedums* occur, while in Yunnan many other species are found. A good many of the earlier discovered

Himalayan *Rhodiolas* are in cultivation, and they are interesting plants. Farther north, in Tibet and Afghanistan, some very peculiar *Sedums* occur, such as *S. Balfouri*, *S. Hobsonii*, *S. Karpelesae*, *S. pachyclados*, which I group with the *Rhodiolas*. For the rest, the Himalayan and Tibetan flora includes a few of the Japonica series (which find here their western limit), a few small annuals, and some miscellanea, such as the *Telephium S. Ewersii*. Altogether close on fifty species are found within this region, almost all of them being perennials; about a dozen of them are in cultivation.

China.

In FORBES and HEMSLEY'S "Enumeration of the Plants of China" (which included the area extending from Formosa on the south to Korea on the north), published in 1887, 28 species constituted the list of *Sedums*. The floral wealth of the interior of China was at that time unknown. Since then the extraordinary results of the botanical explorations of HENRY, WILSON, FORREST, and the French missionaries have been published; hundreds of new plants have been described, and among them are at least 90 new species of *Sedum*. Most of these are from the inaccessible western provinces, and have been described almost entirely from dried specimens. Very few of them are as yet in cultivation. Many are small plants of the Japonica section, of no great horticultural importance; but they include a number of *Rhodiolas*, and some very interesting plants allied to the section *Telephium*, for which two new sections of the genus, *Pseudorhodiola* * and *Giraldiina*. † have been created; one species belonging to the first of these groups (*S. yunnanense* var. *valerianoides*) is in cultivation.

The earliest *Sedums* to come to us from China were *spectabile* and *sarmentosum*, and up to the present few have followed them. Not more than 30 of the 120 or so species known to occur in China are at present in cultivation. While the Japonica section cannot be expected to yield much of garden value, we may look for some interesting species among the Chinese *Rhodiolas*. Some of the Chinese *Sedums*, such as *S. Chaneti* and *S. limuloides*, are very curious plants indeed.

LITERATURE.—FORBES and HEMSLEY, "Enumeration of all the Plants known from China. . . ." *Journ. Linn. Soc., Bot.*, **23**. R. HAMET, "Enumeration and Description of Species of *Sedum* (*Plantae Chinenses Forrestianae*)." *Notes R. Bot. Garden Edinb.*, **5**, 115, 1912. L. DIELS, "Catalogue of all the Plants collected by George Forrest . . ., 1904, 1905, 1906." *Ibid.*, **7**, 1912-3. R. HAMET, "Enumeration of *Crassulaceae* collected in China" [by many collectors]. *Ibid.*, **8**, 139, 1913.

Japan.

In Japan, the latest census (by MATSUMURA, 1912) puts the *Sedum* flora at 25 species, which subsequent additions raise to over

* *Pseudorhodiola* Diels in *Engler's Bot. Jahrbücher*, **29** (1901), p. 360.

† *Giraldiina* Diels in *Engler's Bot. Jahrbücher*, **36** (1905), Beibl. 82, p. 48.

30. A few of these, such as *Aizoon* and *kamtschaticum*, are plants which have their headquarters in Siberia; two others, *Telephium* and *roseum* (which occurs in the var. *Tachiroi*), have a much wider range; but the majority are endemic. A few of them, such as *alboroseum*, *Sieboldii*, and *spectabile*, have long been known in cultivation, the last two being among the handsomest of the garden Sedums. To the *Telephium* section belongs nearly one-half of the species represented in the Japanese flora, while an equal number belongs to the *Japonica* section, which consists mostly of smallish plants with yellow flowers. Of the latter, a ternate-leaved species, *S. lineare*, is in cultivation in our gardens, and two others, *japonicum* var. *senanense* and *Zentaro-Tashiroi*, are reported as in cultivation in Japan. Of the whole Japanese Sedum flora, one-half is known in gardens.

LITERATURE.—MATSUMURA, "Index Plantarum Japonicarum," 2, Part II., 1912. MAXIMOWICZ, "Diagnoses Plantarum Novarum Asiaticarum," v., in *Bull. Acad. Imp. des Sciences de St. Pétersbourg*, 29 (reprinted in *Mélanges Biologiques*, 11), 1884. MAKINO, various papers in *Bot. Mag.*, *Tokio*, &c.

NOTE.—Formosa yields half a dozen Sedums, and the Philippines several. One of the former, *S. formosanum*, is included in the present paper.

The United States and Canada.

Sedums are widely scattered throughout North America, but a larger number is found in the mountainous regions of the west than in the east. Two widespread species, *ternatum* and *pulchellum*, long grown in European gardens, were described by MICHAUX in his "Flora Boreali-Americana" as early as 1803. Another plant found in the Eastern States, *Nevii*, is also long known in British gardens. From the Western States have come two pretty species, *spathulifolium* and *oreganum*; also two *reflexum*-like plants of less merit, *Douglasii* and *stenopetalum*, and the tall and handsome *rhodanthum*. Many species found in the Western States do not appear to be anywhere in cultivation, and my efforts to procure them have had only a limited success. The polymorphic Rose-root, *S. roseum*, which has a circum-polar range, is by American botanists restored to its place as a separate genus (*Rhodiola*); it spreads in varying form along the western mountains, and has been split up into half a dozen species. Except for *S. roseum* s.s. sent me from Washington, I cannot find that any of the American *Rhodiola* forms are in cultivation. Altogether about 50 species of Sedum (including some of the "split" genera) occur in the States, mostly in the south-western portion. Two European species, *annuum* and *villosum*, range in the native state west to Greenland, and are thus included also in the American flora. Several familiar Old World kinds—*acre*, *reflexum*, *spurium*, and *Telephium* subsp. *Fabaria*—are naturalized and run wild in the Eastern States.

The most marked feature of the *Sedum* flora is the occurrence in the west of a well-marked group of small perennial species with spathulate leaves and mostly yellow flowers, of which *S. spathulifolium* and *S. oreganum*, already referred to, are examples. Some of these have the petals joined together in the lower portion (thus approaching the genus *Cotyledon*), and have been separated on this account from *Sedum* by some American botanists; but I have preferred to retain them in that genus.

LITERATURE.—BRITTON and ROSE, "Crassulaceae," in "North American Flora," 22, Part I., 1905.

Mexico.

Mexico, which is now known to be extraordinarily rich in *Sedums* and other *Crassulaceae*, was until recent years a *terra incognita*. Two species of *Sedum*, *moranense* and *oxypetalum*, were described in 1823 among the plants collected on HUMBOLDT'S voyage (vol. 6, pp. 44, 45), and five years later DE CANDOLLE included two more, *dendroideum* and *ebracteatum*, in his "Mémoire sur la famille des Crassulacées" (1828). As a result of herbarium work carried out in connexion with the great "Biologia Centrali-Americana," HEMSLEY was able, in 1879–88, to enumerate 22 species from Mexico in the first volume of the botanical section of that publication. During the last thirty years the explorations of a number of United States botanists have resulted in the discovery of a surprising number of new and interesting species of *Sedum* and of closely allied plants for which new genera have been created, though in a broad sense many of them may be ranked as *Sedums*; so that the species known from Mexico is now verging towards a hundred. Living plants of many of these have been sent to the States by their collectors, and are in cultivation at Washington and other places. They are still almost unknown in British and other European gardens, though many of them are handsome and interesting plants, strikingly different in appearance from any of the Old World *Sedums*. By the kindness of American correspondents, notably Dr. J. N. ROSE (the describer of most of the new species) and Dr. N. L. BRITTON, I have received living specimens of a large number of these species. Plants of all or nearly all of them have now been placed at Kew, Edinburgh, and Dublin (wherever they were not already represented in the collections), and we may hope that these interesting species will now become better known on this side of the Atlantic. They display a remarkable range of form, from stout shrubs several feet in height, such as *oxypetalum* and *praealtum*, to tiny creeping species like *compactum* and *humifusum*; the leaves show every variety of shape and size, and the flowers range through almost every hue. Many of the species are striking and decorative plants, such as *alamosanum*, *cupressoides*, *Stahlii*, *Palmeri*, *bellum*, *nutans*, *pachyphyllum*, and *versadense*.

The correlation of the Mexican Sedums with those of the Old World presents difficulties. The shrubby species appear best placed in the *Seda Genuina*, with which they possess many connecting links. To accommodate another characteristic Mexican group a new section, *Mexicana*, has been instituted.

LITERATURE.—BRITTON and ROSE, "Crassulaceae," in "North American Flora," 22, Part I., 1905, and subsequent papers, mostly by J. N. ROSE, in "Contributions from the U.S. National Herbarium," and elsewhere.

Central and South America.

A few species, of no importance horticulturally, occur in Guatemala, to the south of the great Sedum-centre of Mexico. Farther south, we find that the genus has in old days spread along the great backbone of America, and makes on the Andes its only appearance in the Southern Hemisphere,* a few species being found as far south as Peru, and one as Bolivia.

IV. STATISTICAL.

From the point of view of the gardener anxious to identify a Sedum which is unknown to him, the bringing together, as in the present paper, of all the species in cultivation, instead of helping him, may tend to have the opposite effect, since the comparatively small number of more or less common species (to one of which his plant probably belongs) is buried among a complex of other rarer plants which he is unlikely to encounter. With a view of mitigating this difficulty, I attempt below to indicate the species of most frequent occurrence, and also those at the other end of the scale, thus :

Species very common in Cultivation.

<i>acre</i>	<i>rupestre</i>	<i>spurium</i>
<i>album</i>	<i>sexangulare</i>	<i>Telephium</i>
<i>reflexum</i>		

It is probably no exaggeration to say that out of every ten plants (of Sedum) found in British gardens, nine belong to one or other of these species ; and, furthermore, that of every ten names applied in British gardens to Sedums, five refer to one or other of the seven species above.

Species common in Cultivation.

<i>Aizoon</i>	<i>hybridum</i>	<i>oreganum</i>
<i>altissimum</i>	<i>kamtschaticum</i>	<i>roseum</i>
<i>Anacampteros</i>	<i>maximum</i>	<i>spectabile</i>
<i>anopetalum</i>		

* It just reaches the Equator in Africa (see p. 6).

These are followed in frequency by :

<i>dasyphyllum</i>	<i>Lydium</i>	<i>populifolium</i>
<i>Ellacombianum</i>	<i>Middendorffianum</i>	<i>pulchellum</i>
<i>Ewersii</i>	<i>multiceps</i>	<i>Sieboldii</i>
<i>hispanicum</i>	<i>Nevii</i>	

The above-mentioned species, twenty-seven in all, represent those most usually found in English and Continental gardens, many of them under a multiplicity of names. In identifying a garden Sedum, if it will not fit the figure and description which are given under the name in the present paper, or if the name under which it was received does not appear in the Index, it will be well, first, to compare it with the figures and diagnostic notes relating to the seven species first mentioned. If it clearly cannot be matched there, there is a great probability that it belongs to the second or third list given above.

In many cases the quickest way of "running down" a plant will be found to be to match it roughly by eye by a rapid survey of the illustrations, and then to turn to the description of the suspected species for confirmation. In doing this, the following species may for practical purposes be ruled out, as being extremely rare, and known in Great Britain in only two or three (mostly public) collections :

Species very rare in Cultivation.

<i>adenotrichum</i>	<i>himalense</i>	<i>Selskianum</i>
<i>alpestre</i>	<i>hirsutum</i>	<i>Semenovii</i>
<i>alsinefolium</i>	<i>longicaule</i>	<i>stellatum</i>
<i>bhutanense</i>	<i>monregalense</i>	<i>Stevenianum</i>
<i>bupleuroides</i>	<i>multicaule</i>	<i>Stribrnyi</i>
<i>cauticolum</i>	<i>Praegerianum</i>	<i>Taquetii</i>
<i>Cepaea</i>	<i>pruinatum</i>	<i>Tatarinowii</i>
<i>dumulosum</i>	<i>pseudospectabile</i>	<i>tibeticum</i>
<i>elongatum</i>	<i>purpureoviride</i>	<i>verticillatum</i>
<i>floriferum</i>	<i>quadrifidum</i>	<i>villosum</i>
<i>gracile</i>	<i>rhodanthum</i>	<i>yosemitense</i>
<i>gypsicolum</i>	<i>rubroglaucum</i>	<i>yunnanense</i>
<i>heterodontum</i>		

Also all the Mexican species, with the exception of *praealtum*, *moranense*, and *Stahlia* ; and some Indian, Chinese, and Japanese species, including the Japonica series of MAXIMOWICZ and a few others :

<i>Celiae</i>	<i>japonicum</i>	<i>Someni</i>
<i>Chaneti</i>	<i>Leblancae</i>	<i>trullipetalum</i>
<i>Chauveaudi</i>	<i>lineare</i>	<i>varicolor</i>
<i>formosanum</i>	<i>multicaule</i>	<i>viscosum</i>
<i>indicum</i>	<i>sarmentosum</i>	<i>Zentaro-Tashiroi</i>

And, lastly, the plants listed on p. 5, which though they are or were in cultivation, I have not succeeded in seeing.

V. VARIATION.

The species of the genus *Sedum* present a wide range of size, form, and colour. Minute creeping species are found in both the Old and New Worlds, and many of the annual species are very small; on the other hand, some of the herbaceous perennials of the *Telephium* section produce annually stems a yard or more in height, and a few of the sub-shrubby Mexican species are equally tall. As regards duration, about four-fifths of the known species are perennials—many herbaceous (that is, dying back to the root in autumn), many evergreen, a few deciduous (that is, having perennial stems but losing their leaves in winter); the remaining species are mainly annuals, a few being biennials.

Hairiness is rare in the genus; and the most constant characteristic is a tendency to succulence, which in many species attains a very marked development, and enables them to live in very dry places. As an example of the amount of water which these plants may contain, a leaf of *S. nutans*, a Mexican species bearing the largest leaves found in the genus, weighed .75 ounce fresh, and when thoroughly air-dried .02 ounce—in other words, $\frac{73}{8}$, or over 97 per cent., of its weight was due to water stored up in the leaf.

The species of *Sedum* differ much as regards the variability which they display. Some are very stable and constant in character; many others vary within limits, mostly as regards habit and leaf; while some are highly variable, and, as regards at least general appearance, differ more from their type than some allied but quite distinct species do from each other. Thus, *S. roseum*, at once the most variable and the most widely distributed of Sedums, has flowers which range from the normal yellow through red to deep purple, and which may be dioecious or hermaphrodite; the stem may be stout or slender, a couple of inches or a foot in height; the leaves green to very glaucous, broadly ovate to linear, entire to deeply toothed. Other conspicuously variable species are *S. album*, *altissimum*, *anopetalum*, *reflexum*, *Aizoon*, *spurium*, *Telephium*.

Appended are notes of the more conspicuous cases of variation (including "sports") found among the cultivated Sedums:

Roots varied and often characteristic—thick and tuberous (section *Telephium* especially), woody and hard (section *Aizoon*), or fibrous.

Root-stock thick and elongate with conspicuous scale-leaves (many *Rhodiolas*), or spreading laterally into a fleshy mass (other *Rhodiolas*, *Sedastrum*), or absent.

Stem very variable as regards form and duration; perennial and semi-woody (e.g. *S. populifolium* and many Mexican species), creeping and branching indefinitely (*Seda Genuina*), annual and erect (*Telephium*, *Aizoon*, &c.).

Leaves mostly entire, sometimes serrate, never more divided than pinnatifid (*S. trifidum*); spherical or cylindrical to flat, but never really thin; green or glaucous, rarely hairy or glandular; sessile or stalked, often spurred at base.

Inflorescence mostly cymose, flattish on surface and roundish in outline: sometimes racemose or paniculate. Fig. 1 (*S. lineare*) shows a very characteristic and common type, formed of three dichotomous branches with a flower in the primary and secondary forks, and a bract subtending each flower.



FIG. 1.—Inflorescence of *S. lineare*, from above.

tomous branches with a flower in the primary and secondary forks, and a bract subtending each flower.

Sepals regular in European and most Asiatic species, often markedly irregular in Chinese and Mexican plants.

Petals very small and inconspicuous (some *Rhodiolas*), or relatively large and mostly brightly coloured, patent or seldom erect; entire or seldom fringed.

Stamens normally 10; 5 in a few species, most of which have no near relationship to each other.

Carpels erect or stellate; seeds borne in a row along the inner face of the carpel, very seldom (e.g. *S. Celiae*) in a bunch near the base of the carpel.

Hybrids.

Hybrids are rare in the genus. A notable exception occurs in the case of *S. Telephium* and its near ally *S. maximum*, which cross freely in the wild state and in the garden. Otherwise only a very few hybrids are known.

S. altissimum × *reflexum* = *S. luteolum* Chaboisseau (France).

S. acre × *sexangulare* = *S. Füreri* K. Wein (Harz Mountains).

S. annuum × *sexangulare* = *S. erraticum* Brügg. (Switzerland).

S. annuum × *alpestre* = *S. engadinense* Brügg. (Switzerland).

S. atratum × *annuum* = *S. Derbezii* Petitmengin (Maritime Alps).

S. Aizoon × *kamtschaticum*. (Wisley, where it was received from a garden as *S. kamtschaticum*. Also seen at Cambridge.)

S. Telephium × *maximum*. (Frequent in gardens where the two species are grown.)

Owing no doubt to the fact that the genus is not a popular one among plant-fanciers, we have escaped so far from the production of endless uninteresting artificial hybrids, such as now confuse the allied genus *Saxifraga*.

Sports.

Variation in the way of teratology is rare in the genus.

VARIATION.—The best known and most pleasing of the few variegated forms of *Sedum* are *S. Sieboldii* with a gold patch in the middle of each leaf, and *S. kamtschaticum* with the leaves splashed with gold. A fine variegated form of *S. maximum* is figured in "Flore des Serres," 16, t. 1669. Of *S. alboroseum* there is a form with a large silver patch in the centre of each leaf, and another with a marginal band of white, or rather of pale green. Two variegated forms of *S. acre* are in cultivation, one of which has the tips of the shoots golden in spring, the other silver. Of the tender *S. lineare* a form has been long in cultivation with the leaves silver-margined.

Of *S. Telephium*, *S. maximum*, *S. album*, *S. spathulifolium*, forms are grown in which purple pigment is conspicuously present in the stem and leaves.

In *The Garden* for 1901, Mr. S. Arnott refers to a small silver-variegated *Sedum* under the name *S. caespitosum*. I have not been able to trace this plant.

FASCIATION.—This monstrosity is rare in *Sedum*, but one remarkable example is frequent in gardens—the "Cock's-comb *Sedum*," which is a sport of *S. reflexum*. From Messrs. BACKHOUSE of York came a smaller plant resembling the last, which is possibly a fasciate *S. anopetalum*, but no normal branch which might flower has been produced yet. I have received from New York a similar sport of the Mexican *S. praealtum*; the last was included a few years ago in HAAGE and SCHMIDT's list, under the name *S. dendroideum cristatum*. The var. *arboresum* of *S. moranense* has a persistent tendency to fasciation at the ends of the branches.

The botanist who consults the present paper in the hope of finding an epitome or revision of the described varieties of the more variable species of *Sedum*, such as *S. roseum*, *maximum*, *Telephium*, *anopetalum*, *reflexum*, will be disappointed. In the first place, the paper deals only with the plants as found in cultivation; and in the second place, the varietal characters as found in cultivation themselves vary so much in degree, and are, moreover, so variously grouped, that frequently no form can be found differing in more than a single character from that nearest to it; and these characters individually are not of sufficient importance nor sufficiently stable to warrant the erection upon them of varieties, using the term in its usual botanical sense.

Thus, if we take three leading characters such as varieties are usually constructed upon in this genus, for instance, shape of leaf, colour of leaf, and colour of flower, and designate the normal characters by *a*, *b*, *c*, and the variants by *a'*, *b'*, *c'*, we shall in a large collection of growing plants, such as the writer got together for the purposes of the present paper, be able to find many of the possible combinations

of these, such as $ab'c$, $ab'c'$, $a'b'c$, $a'bc$, and so on. The best-marked variant from the type abc would be $a'b'c'$, and even such a form as $ab'c'$ might be allowed varietal rank were it not for the existence of the forms $ab'c$ and abc' . To this must be added the fact that a , b , c , a' , b' , and c' are not constant quantities, but exist in intermediate degrees which connect a and a' , and so on. Thus, glaucescence may vary by imperceptible degrees into green, and an ovate leaf into a lanceolate or linear leaf. So that in diagnosis we have to deal not only with the number of characters in which a form may agree with or approach a well-marked variety, but with the degree in which each of these characters is present. To conclude, the study of a large growing series of forms of the variable species of *Sedum* as found in cultivation puts one out of conceit with the application of varietal names to most of them.

But it may be pointed out that, owing to the absence of intermediates in a given area, such forms may assume a very definite local importance, which may fully justify their being dealt with in local floras, though on a wider view their distinctness may disappear. It may be added that the study of a large series of *Sedums* derived from garden sources has this bearing on the botanical as opposed to the horticultural side of the question: that as *Sedums* are almost invariably propagated by division, and as they do not tend in most cases to seed themselves in gardens, the numerous garden forms undoubtedly mostly represent wild forms, and give a true conspectus of the natural range of variation of the different species.

VI. CULTIVATION AND PROPAGATION.

Most *Sedums* are of the easiest cultivation, and given perfect drainage and a light soil no difficulty will be experienced. Many—though not all—are especially at home on an old wall, where they will withstand any degree of drought. The vitality as against want of water of many *Sedums* is indeed remarkable, and few plants are better fitted to endure the adverse conditions of soil and moisture which are found, say, on a wall-top. But it would be a mistake to imagine that such conditions are necessary or favourable to their growth. The majority flourish best under ordinary garden treatment; some, such as the *Telephiums*, prefer a rich moist soil; and one or two, such as the European *S. villosum* and the North American *S. pulchellum*, though possessing a succulence as great as many of the most xerophilous species, actually require in many gardens marshy conditions to secure their continuance.

The majority of the *Sedums* found in cultivation are quite hardy in our climate, but a considerable minority cannot be so classed. Thus, the Mexican *Sedums* come from a tolerably warm climate, and as a whole are best suited to a cool house. Their hardiness in the British climate has not as yet been fully tested save in a few

instances. The following notes are arranged in descending order of hardiness.

R *S. moranense*—Hardy throughout greater part of British Isles.

R <i>S. confusum</i>	}	Less hardy than the last. Injured, but not killed in the open in Dublin in bad winters. <i>S. Palmeri</i> has been grown in the open for many years at Great Warley, Essex. At Wisley, in the severe winter of 1916-17, <i>S. retusum</i> , <i>S. Palmeri</i> , and <i>S. compressum</i> withstood in the open a temperature of -2° F. (34° of frost) on grass twice, and -4° F. once.
<i>S. retusum</i>		
R <i>S. compressum</i>		
R <i>S. Palmeri</i>		
R <i>S. praealtum</i>		

R <i>S. Bourgaei</i>	}	Barely survive a mild winter at Dublin in the open.
<i>S. cupressoides</i>		
R <i>S. diversifolium</i>		
R <i>S. griseum</i>		
R <i>S. mexicanum</i>		

<i>S. oaxacantum</i>	}	Uninjured in a cold frame in Dublin, where frost sometimes penetrated slightly.
<i>S. alamosanum</i>		
R <i>S. amecamecanum</i>		
<i>S. compactum</i>		
<i>S. frutescens</i>		

<i>S. mellitulum</i>	}	Very sensitive to frost. A cold frame was often not sufficient protection in Dublin, even when covered when frost was expected.
<i>S. rhodocarpum</i>		
<i>S. allantoides</i>		
<i>S. humifusum</i>		
<i>S. Liebmannianum</i>		
<i>S. longipes</i>		
<i>S. nutans</i>		
<i>S. pachyphyllum</i>		
<i>S. potosinum</i>		
<i>S. Treleasei</i>		

The species marked R have succeeded well in the open in the garden of Sir John Ross-of-Bladensburg, at Rostrevor, Co. Down, an exceptionally mild spot.

Hardiness in these cases cannot, so far as the slight evidence goes, be gauged by the altitude of the Mexican habitats. Thus, the quite tender *Liebmannianum*, *nutans*, and *pachyphyllum* grow in their native haunts about as high on the mountains (6,000-7,500 feet) as the hardy *moranense* and *retusum* (6,000-8,000 feet).

Of the tender Chinese species, the majority belong to the Japonica series, and they vary from hardy in most parts of the British Isles, e.g. *S. sarmentosum*, to distinctly tender, e.g. *S. lineare*. The rest include the peculiar *S. Chaneti* and some annual plants.

The other Sedums found in cultivation which are not hardy come from various parts of the world: *S. nudum* from Madeira,

S. lancerottense from the Canaries, *S. formosanum* from Formosa. *S. proponticum* from Asia Minor has several times died in the open with me, and M. CORREVEON reports that it is not hardy at Geneva.

To sum up, none of the Mexican Sedums are fully hardy throughout the British Isles (though some of them are nearly so). The same remark applies to the species of the Japonica series known in cultivation, and other Chinese species. The remaining tender Sedums found in cultivation are few; they come from various southern regions, and belong to various groups.

Very little need be said as to propagation. The Sedums are notorious for the ease with which any scrap will take root and grow, and this applies throughout the whole genus. With the fleshy-rooted species, such as *S. Telephium*, root-cuttings will strike; and similarly pieces of the fleshy caudices of the *Rhodiolas* will root at once; the

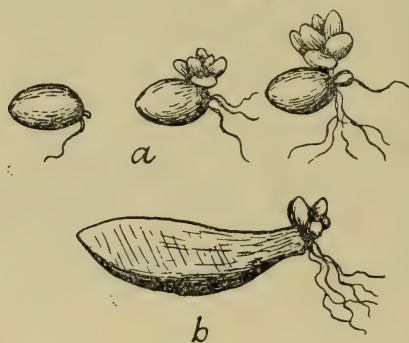


FIG. 2.—Propagation of *Sedum* from leaves
a. *S. Stahlia*; b. *S. Adolphi* (nat. size).

flowering-shoots of the latter group, if pulled off with a “heel” when half-grown, will often strike likewise.

Another and interesting means of propagation results from the capacity possessed by single leaves, when detached, of producing a bud and roots from their base (fig. 2), which speedily form a new plant. This power is found widely spread in the genus, and equally in terete-leaved and flat-leaved, large-leaved and small-leaved plants: for instance, in *S. brevifolium*, *Stahlia*, *album*, *reflexum*, *pachyphyllum*, *diversifolium*, *bellum*, *nutans*, *praealtum*, *versadense*, *Treleasei*, *Telephium*; even some of the annual or biennial plants—for instance, *S. indicum*—can produce young plants from the leaves, and thus cease to be annuals or biennials. I have not observed this power of budding in any member of the *Rhodiola* or *Aizoon* sections.

Some of the *Telephium* section—*S. viviparum* notably, and also its ally, *S. verticillatum*—produce in the upper part of their annual stems numerous small leafy buds which, when the stems fall, root readily and form new plants. Similar short shoots are produced on the flowering stems of the N. American *S. Douglasii*.

Fertile seed is usually produced abundantly in the genus, and germinates readily.

VII. SOURCES OF MATERIAL.

It may be well to indicate from what sources the material used in the present study was obtained ; this will enable any student of the genus who comes after to know what fields were explored and what were not, and will indicate the directions in which possible fresh material may be sought. The following paragraphs must also serve as a very inadequate acknowledgment of invaluable assistance received from many quarters in the supplying of living material.

In the case of the following collections, all the *Sedums* contained in them were examined, either by means of personal visits or through having received and where necessary grown a plant of each species :

Kew, Royal Botanic Gardens.
 Edinburgh, Royal Botanic Gardens.
 Dublin, Royal Botanic Gardens.
 Wisley, Royal Horticultural Society's Garden.
 Cambridge, Botanic Garden.
 Oxford, Botanic Garden.
 Dublin, Trinity College Botanic Garden.
 Chelsea, Physic Garden.
 Bristol, University Botanic Garden.
 Brussels, Jardin Botanique.
 Copenhagen, Universitets Botaniske Have.
 Stockholm, Bergianska Trädgården.
 Upsala, Universitets Botaniska Trädgård.
 Lund, Botanic Garden.
 Petrograd, Jardin Impérial Botanique de Pierre le Grand.
 Berlin, Dahlem Botanischer Garten.
 Hamburg, Botanischer Garten.
 Bremen, Botanischer Garten.
 Leipzig, Botanischer Garten.
 Heidelberg, Botanischer Garten.
 Dresden, Botanischer Garten.
 Paris, Muséum d'Histoire Naturelle.
 Cap d'Antibes, Villa Thuret.
 Naples, Orto Botanico.
 Catania, Orto Botanico.
 New York, Botanic Garden.
 Ottawa, Botanic Garden.
 Sapporo, University Botanic Garden.

Also many private collections, such as those of the late Lady HANBURY (La Mortola), E. A. BOWLES (Waltham Cross), the late Canon ELLACOMBE (Bitton), H. J. ELWES (Colesborne), F. J. HANBURY (East Grinstead), the late Sir FRANK CRISP (Henley-on-Thames), Rev. R. H. WILMOTT (Hereford), G. B. MILNE-REDHEAD (Frome), Miss WILLMOTT

(Great Warley) ; and a number of nurseries, including those of Messrs. BACKHOUSE (York), CUNNINGHAM, FRASER & Co. (Edinburgh), the TULLY NURSERY (Kildare), LISSADELL NURSERY (Sligo), &c.

Plants were also received from :

Christiania, Botaniske Have,
Tiflis, Botanic Garden,
Washington, Smithsonian Institution,
St. Louis, Missouri Botanic Garden,

and from many private gardens and nurseries, including those of Messrs. REGEL & KESSELRING (Petrograd), F. SÜNDERMANN (Lindau), H. CORREVON (Geneva), HAAGE & SCHMIDT (Erfurt), and at home those of Messrs. BEES, Ltd., T. S. WARE, J. WOOD, CLARENCE ELLIOTT, BOWELL.

My best thanks are due to a number of foreign botanists who sent collected plants or seeds, and thus helped in many cases to introduce additional species into cultivation, some of which have proved to be new to science :

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Prof. H. M. HALL (California).
Prof. J. A. HENRIQUES (Portugal).
Mrs. HENSHAW (British Columbia).
Rev. Père E. E. MAIRE (Yunnan).
Dr. G. V. PEREZ (Teneriffe).
Mrs. STOKER (British Columbia).
E. R. WARREN (Colorado).

The baneful influence of the European war hindered work after the first year of the period of my investigation, and subsequently stopped practically all intercourse with foreign countries so far as the receipt of material was concerned. I was unable to carry out a trip which had been planned to include gardens at Frankfurt, Darmstadt, Vienna, Lindau, Geneva, and Paris, at some of which, I have no doubt, additional species of *Sedum* would have been obtained, and many requests for material, which in happier times might have had interesting results, were rendered abortive.

VIII. NOTES ON THE TEXT.

A word as to the arrangement of the material under each species. Following on the reference to original publication, a limited number of further references are added to writings where the species has been especially fully dealt with. More references are given to obscure species or those new to cultivation than to well-known ones—in the case of familiar species references to standard works are omitted.

The notes on synonymy which follow are limited to names still sometimes used in gardens for the plants in question.

Then follow references to published figures of the plants. These, like the references mentioned above, have all been verified by consultation of the original works, and they include only useful illustrations: poor figures are not referred to.

There follow notes pointing out the distinctions between the species under notice and its nearest allies. These together with the figure will in most cases be sufficient to identify any plant.

A tolerably full description of each species is then given, taken in almost every case from the living plant and afterwards checked by comparison with descriptions in the leading floras. In every case where I saw a living plant at all I was able also to grow it, mostly for several years, and could observe it at all seasons. In the case of plants certainly in cultivation which I did not succeed in seeing (4 out of 151 species described in the paper), the descriptions are quoted from an authority which is named.

Descriptions of varieties are added, and miscellaneous notes relating to the plant in its native or cultivated state, and to the sources from which it was obtained.

PART II.—DESCRIPTIVE.

IX. CHARACTERS OF THE GENUS.

Sedum Linn.

LINNAEUS, "Genera Plantarum," No. 579. DE CANDOLLE, "Mémoire sur la famille des Crassulacées," 1828. *Ibid.*, Prodrômus, 3, p. 401. BENTHAM and HOOKER, "Genera Plantarum," 1, p. 659. Schönland in ENGLER and PRANTL, "Naturliche Pflanzenfamilien," III. 2a, p. 29. DALLA TORRE and HARNES, "Genera Siphonogamarum," p. 197.

Succulent plants, mostly perennial, very rarely hairy. *Leaves* flat to cylindrical, entire or nearly so, usually alternate, rarely opposite or verticillate. *Inflorescence* usually cymose. *Flowers* usually bisexual (rarely unisexual by abortion), and 5- (sometimes 4-, rarely 3-, 6-, or 7-) parted, white or yellow, more rarely red or purple, very rarely blue. Sepals, petals, and carpels equal in number, stamens twice as many (very rarely equalling them in number). *Sepals* often fleshy and leaf-like. *Petals* separate to the base, or nearly so. *Stamens* free, or those opposite the petals adnate to them in the lower portion. *Hypogonous scales* small, entire or slightly toothed. *Carpels* separate, or nearly so. *Follicles* almost always many-seeded.

Most of the genera of Crassulaceae have rather indefinite boundaries, and the present genus is no exception. There is a difficulty about deciding on the best line to be drawn between *Sedum* and *Crassula*, *Cotyledon*, and *Sempervivum*. This is especially felt in the case of many of the species discovered in recent years in Mexico and the

western United States. American botanists have created a number of new genera for the reception of these, but they do not appear to be generically distinct in the accepted sense, nor does this tend to facilitate their determination or the understanding of their relationships; and I have retained some of them (*Cremnophila*, *Clementsia*, *Sedastrum*, *Gormanina*) in *Sedum*, under which genus they were first described. Some of the others (e.g. *Altamiranoa*, *Dudleya*, *Stylophyllum*, *Villadia*) appear best placed in *Cotyledon*.

Other generic names now included in the genus *Sedum* are *Rhodiola* L. (now section *Rhodiola*); *Anacampteros* Tournefort (now section *Telephium*); *Procrassula* Grisebach (= *Aithales* Webb. & Berth), a small 5-stamened group included below in section *Epeteium*; *Telmisssa* Fenzl, characterized by being one-seeded, but closely approached in this respect by a few other species.

The genus includes some well-marked groups, and others of less definite boundaries; these groups being founded mainly on general

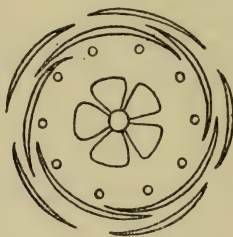


FIG. 3.—Floral Diagram of *Sedum* (after De Candolle).

growth-form. In the ensuing pages the generic subdivisions used, and their definitions, are as follows:

Section I. *RHODIOLA* Scopoli (char. amplific.).—Perennial. Rootstock fleshy, crowned with leaves with a broad clasping base (often reduced to membranous deltoid or semi-orbicular scales, or becoming so with age), from the axils of which annual leafy flowering shoots are produced. Flowers 4- or 5-parted, diœcious or hermaphrodite. Hardy plants, mostly Asiatic. (P. 26.)

Section II. *PSEUDORHODIOLA* Diels.—Perennial. Flowers diœcious, 4-parted, and otherwise as frequent in *Rhodiola*. Vegetative parts and carpels as in *Telephium*. Hardy Chinese plants. (P. 73.)

Section III. *TELEPHIUM* S. F. Gray.—Perennial. Rootstock usually thick, branched, often of carrot-like tubers, summit without scales. Stems mostly annual, produced from buds beside or above the bases of the stems of the previous year. Flowers hermaphrodite, 5-parted, white, red, purple, or green. Hardy plants, mostly Eurasian. (P. 77.)

[Section IV. *GIRALDIINA* Diels.—Not in cultivation—two Chinese species only.] (P. 107.) *S. pulchrum*

Section V. *AIZOON* Koch.—Perennial. Rootstock thickened, roots slender. Stems annual (except *S. hybridum*). Leaves flat.

Flowers hermaphrodite, 5-parted, bright yellow. Hardy East Asiatic plants. (P. 107.)

Section VI. MEXICANA Praeger.—Perennial. Rootstock thickening horizontally, or contracted. Stems tufted, erect (at least at first), usually biennial, dying to the root after flowering, the succeeding set when annual usually arising when the previous set is flowering, so that the plants are evergreen. Flowers hermaphrodite, 5-parted, mostly white, rarely red or yellow. Tender Mexican plants. (P. 127.)

Section VII. SEDA GENUINA Koch.—Perennial. Stems perennial, creeping, or erect and sub-shrubby, bearing barren and annual flowering shoots. Flowers hermaphrodite, usually 5- (rarely 4- to 9-) parted. Hardy or tender. (P. 144.)

Section VIII. SEMPERVIVOIDES Boissier.—Annual or biennial. Leaves flat, root-leaves forming a rosette. Inflorescence corymbose or racemose-paniculate. Hardy or tender Eurasian plants. (P. 279.)

Section IX. EPETEIUM Boissier.—Annual, rarely biennial. Leaves semi-terete or cylindrical (rarely flat), not rosulate. Inflorescence cymose 2- or many-branched, or corymbose. Hardy or tender. (P. 293.)

The present paper purports to deal only with those species of *Sedum* which are known in cultivation at the present time. The majority of these species, and almost all the better-known ones, are hardy in the British Isles, and are plants of the rock-garden, more rarely of the herbaceous border. The tender plants come mainly from Mexico and China, and are unevenly distributed among the different sections of the genus. A conspectus of the cultivated species from this point of view appears as follows, the test of the rather vague term "hardy" being capacity for enduring an ordinary winter in Dublin:

	Hardy.	Tender.
Section I. <i>Rhodiola</i> Scop.	20	0
„ II. <i>Pseudorhodiola</i> Diels	1	0
„ III. <i>Telephium</i> S. F. Gray . . .	13	0
„ IV. <i>Giraldiina</i> Diels	0	0
„ V. <i>Aizoon</i> Koch	7	0
„ VI. <i>Mexicana</i> nov. sect.	0	15
„ VII. <i>Seda Genuina</i> Koch	40	40
„ VIII. <i>Sempervivoides</i> Boiss. . .	3	2
„ IX. <i>Epeteium</i> Boiss.	6	3
„ X. <i>Telmissa</i> Fenzl	0	0
	<hr/> 90	<hr/> 60

The division of a plant-group into tender and hardy species, although convenient for the horticulturist, is quite unscientific. In the case of the present genus, however, this inconvenience is at a minimum, since, as seen from the above conspectus, the species composing its natural subdivisions are in many cases either all hardy or nearly so, or all tender or nearly so. Using the term "hardy" as meaning hardy in suitable situations throughout the British Isles, we find that the

definition includes the whole *Sedum* flora of Europe, of Asia (except the series *Japonica*, which is with very few exceptions tender, and a few others), and one (*S. multiceps*) of the endemic African species, also the *Sedum* flora of Canada and the United States; the large Mexican group being treated as tender, though one or two are nearly hardy.

The hardy category includes the whole of the Eurasian groups *Rhodiola*, *Pseudorhodiola*, *Telephium*, *Aizoon*, most of the Eurasian *Seda Genuina* except the *Japonica* series, and several species of the *Sempervivoides* and *Epeteium* sections, which consist of annual or biennial plants.

The half-hardy and tender *Sedums* which are in cultivation belong to three geographical groups. They include a small portion of the very rich *Sedum* flora of Asia; the greater part of the remarkably varied *Sedum* flora of Mexico and the lands which border it; and a couple of species from the Atlantic Islands off the coast of Africa.

In many respects the tender group differs as a whole in character and affinities from the Eurasian and North American plants which constitute the hardy *Sedums*.

Mexican Species.

The Mexican *Sedums* (with which may be included a few related species from the south-western United States), which form the largest group among the tender species, present an array of forms bewildering in their variety, and many of them not easy to place in any scheme of classification adapted to the *Sedums* of the Old World (which constitute the bulk of the genus). The sections *Rhodiola*, *Pseudorhodiola*, *Telephium*, and *Aizoon* (the first and third of which have representatives in the United States) are absent. But there are present a number of species, which, though possessing no other affinity with these, agree with them and differ from the *Seda Genuina* in having stems which die back to the rootstock after flowering. These stems are mostly but not always annual, usually arising in summer or autumn and lengthening to a varying extent, resting during the winter, and flowering and dying in the following spring or summer. The rootstock is sometimes large and fleshy, as in some members of the *Sedastrum* group, more often small, with a tuft of fibrous roots. The flowers are mostly white, but one species has red and one yellow flowers; and the stems and leaves exhibit considerable variety. Nevertheless, the growth-form is distinctive; they are best classed together as a separate section, MEXICANA.

The bulk of the Mexican species fall under the section *Seda Genuina* of Koch, but display a much wider range of form than is found in the Old World. A tendency to shrubbiness, as seen in the Old World in *S. populifolium* Pallas from Siberia, and in a reduced measure in *S. multiceps* Coss. & Dur. from Morocco and *S. variicolor* from China, is well developed in many Mexican species, many of them forming

much-branched bushes from one to several feet in height. The flowers and leaves of these sub-shrubs vary in form and colour, and there is no general affinity between them. It is to be noted also that while in some of the shrubby species (e.g. *S. oxypetalum*, *S. retusum*) the upright single-stemmed habit is retained in old plants, in others which are for some time erect (e.g. *S. allantoides*, *S. pachyphyllum*, *S. Treleasei*) the branches at length sag under their own weight, and, resting on the ground, take root, so that eventually a patch is produced differing in no essential particular from the characteristic mat form of the *Seda Genuina*.

Another unusual feature of some of the Mexican *Seda Genuina* is that the inflorescence is not terminal, but lateral. An intermediate stage is seen in *S. Palmeri* S. Watson and *S. compressum* Rose, in which the young inflorescence appears in the centre of the leaf-rosette, but soon a shoot arises from just below the flowering-shoot, and growing and straightening out pushes the flowering-shoot to one side, so that when in bloom the latter is lateral and springs from a point below the leaf-rosette. In a few other species, e.g. *S. nutans* Rose, *S. pachyphyllum* Rose, *S. Adolphi* Hamet, the inflorescence is frankly lateral, borne on a short axillary branch which arises several inches below the summit of the stem. This is a step towards the characteristic feature of the Eurasian section *Rhodiola*, in which an annual crop of flower-shoots arises from the axils of scale-leaves on the fleshy caudex.

Few of the Mexican Sedums display any near relationship with those of the United States or Canada, and some of the yellow-flowered species, such as *S. mexicanum* Britton and *S. oaxacanum* Rose, strikingly recall Japanese and Chinese plants of the series *Japonica* of MAXIMOWICZ.

The Mexican species vary in hardiness from quite tender (the majority) to nearly hardy (e.g. *moranense*, *Palmeri*, *compressum*, *retusum*, *confusum*, *praealtum*, which are hardy in all the milder parts of the British Isles [p. 17]).

Of over 75 species so far described from the area, 44 are listed below as at present in cultivation.

Tender Asiatic Sedums.

The tender Asiatic species belong mostly to the series *Japonica*, founded by MAXIMOWICZ to include a few glabrous perennial plants with fibrous roots, slender, procumbent, mostly rooting stems, spurred leaves, 5-parted stellate yellow flowers, narrow acuminate petals, carpels $\frac{1}{2}$ -connate, and stellate-patent fruit. Recent exploration, especially in China, has raised the number of them considerably, and has broadened their definition. They have, as MAXIMOWICZ remarks, more affinity with some of the American Sedums than with European or other Asiatic groups. A few (e.g. *variicolor*, *Chauveaudi*, *sarmentosum*) are hardy in the milder parts of the British Isles.

The remaining Asiatic tender species are few, and various :

Chaneti Hamet (section *Seda Genuina*, but anomalous).

indicum Hamet } section *Sempervivoides*.
viscosum Praeger }

formosanum N. E. Brown }
Leblancae Hamet } section *Epeteium*.
Someni Hamet }

Finally, of the few species of *Sedum* inhabiting the Atlantic Islands, two are in cultivation belonging to the section *Seda Genuina*—*S. lancerottense* Murray, and *S. nudum* Aiton.

The only large geographical region where *Sedums* occur not represented in the species known in cultivation is Central Africa, where a few interesting species are found on high mountains (see p. 6).

X. DESCRIPTION OF SPECIES.

SECTION I.—RHODIOLA.

Section RHODIOLA Scopoli, "Introd. ad Hist. Nat.," 255, 1777 (*char. ampl.*). Praeger in *Trans. Bot. Soc. Edinb.*, 27, 107, 1917.

Rhodiola Linn., "Genera Plantarum," ed. i. 318, 1777 (*pro genere*).

Perennial. Caudex fleshy, crowned with leaves with a broad clasping base (often reduced to membranous, deltoid or semi-orbicular scales, or becoming so with age) from the axils of which leafy flowering-shoots are produced. Flowers 4- or 5-parted, diœcious or hermaphrodite. Hardy plants, mostly Asiatic.

LINNAEUS founded his genus to include a single species, *R. rosea*, the well-known Roseroot. SCOPOLI reduced *Rhodiola* to a section of *Sedum*, and most authors have followed him in this. While some have limited *Rhodiola* to species which, like *roseum*, have unisexual and 4-parted flowers, others have included plants like *S. crassipes*, which have hermaphrodite 5-parted flowers combined with the characteristic thick scaly *Rhodiola* rootstock. I have endeavoured * to show that a continuous series of forms leads from the *roseum* type with diœcious 4-parted flowers, poorly developed scales, and massive rootstocks, through others with hermaphrodite 5-parted flowers and larger scales with a leaf-like tip, to forms like *S. Praegerianum* and *S. primuloides*, with hermaphrodite flowers, well-developed leaves instead of scales crowning the rootstock, and short or slender rootstocks. Some members of each group are in cultivation.

Series I. RHODIOLAE sensu stricto.

Flowers usually unisexual and 4-parted, caudex usually elongate or greatly thickened. Carpels usually short and crowned with short styles reflexed in fruit.

* PRAEGER, "On the Affinities of *Sedum Praegerianum* W. W. Smith, with a Tentative Classification of the Section *Rhodiola*." *Trans. Bot. Soc. Edinb.*, 27, 1917.

Group 1. ROSEAE.—Caudex-leaves scale-like, short, membranous, seldom green even when young. Old flower-stems not persistent. (P. 28.)

<i>roseum</i> Scop.	<i>elongatum</i> Wall.
<i>heterodontum</i> H. f. and T.	<i>bhutanense</i> Praeger.
<i>Kirilowii</i> Regel.	<i>purpureoviride</i> Praeger.
<i>longicaule</i> Praeger.	<i>bupleuroides</i> Wall.
<i>rotundatum</i> Hemsl.	

Group 2. HIMALENSES.—Caudex-leaves scale-like, usually green and fleshy when young, often prolonged into a short narrow blade or tail. Old flower-stems usually persistent. (P. 49.)

<i>tibeticum</i> H. f. and T.	<i>himalense</i> Don.
<i>quadrifidum</i> Pallas.	<i>fastigiatum</i> H. f. and T.

Series II. CRASSIPEDES.

Flowers hermaphrodite and 5-parted. Caudex as in the Rhodiolae s.s. Caudex-leaves as in the Himalenses. Flower-stems persistent or deciduous. Carpels usually slender, with slender styles not reflexed in fruit. (P. 55.)

<i>crassipes</i> Wall.	<i>trifidum</i> Wall.
<i>Stephani</i> Cham.	<i>Semenovii</i> Masters.
<i>dumulosum</i> Franch.	<i>rhodanthum</i> A. Gray.

Series III. PRIMULOIDES.

Flowers as in the Crassipedes. Caudex slender elongate, or short not much thickened (comparatively). Caudex-leaves leaf-like, with a distinct blade, usually stalked.

Group 1. LONGICAULES.—Rootstock elongate, much branched.

primuloides Franchet.

Group 2. BREVICAULES.—Rootstock very short, branched slightly or not at all.

Praegerianum W. W. Sm.

Rhodiola is essentially an Asiatic and sub-alpine group, finding its maximum development in the great mountain area stretching from Afghanistan to Yunnan. Northward it extends into the Arctic Regions; southward its range is limited. One species, *S. roseum*, which is also the most variable of the group, is circumpolar in its distribution. Another, *S. rhodanthum*, is confined to North America. Of the group in its wide sense, as used in this paper, about fifty species have been described, of which twenty-one are in cultivation, as listed above and described below.

The great variability of many of the species (see HOOKER and THOMSON in *Journ. Linn. Soc., Bot.*, vol. ii. p. 93) renders diagnosis often difficult. Especially as regards the colour of the different

parts of the flower, the following descriptions must not be taken as exhausting the range of variation which many of the plants possess.

Series I. RHODIOLAE s.s.

Group I. ROSEAE.

I. *Sedum roseum* Scopoli (fig. 4).

S. roseum Scopoli, "Flor. Carniolica," ed. 2, 1, 326, 1772.

SYNONYMS.—*Rhodiola rosea* Linn., "Species Plantarum," 1035. *Sedum Rhodiola* De Candolle, "Prodromus," 3, 401; Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 128; Masters in *Gard. Chron.*, 1878, ii. 267.

ILLUSTRATIONS.—Sowerby, "English Bot.," ed. 3, pl. 525. De Candolle, "Plantas Grasses," tab. 143. "Flora Danica," tab. 183. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 3. *Trans. Russian Hort. Soc.*, 1863, tab. 129.

A very variable species, of which the common European (and British) form is described below. *S. roseum* includes plants which vary from very glaucous to bright green, with leaves much toothed or entire and of a wide range of shape, and flowers green, yellow, red, or purple. Nevertheless, it can generally be easily separated from its allies: *S. heterodontum*, which may be only an extreme variety, is distinguished at once by its short, very broad, much-toothed leaves; *S. Stephani* has 5-parted (not 4-parted) flowers, usually hermaphrodite (instead of diœcious), or if diœcious the male ovaries are comparatively large, and the plant is green; *S. Kirilowii* is also green, with 5-parted diœcious flowers, the leaves are usually much longer than in *roseum*, and broadest at the base instead of near the apex, and the plant taller (a foot or more); but the last three are variable, and caution is necessary.

DESCRIPTION.—A glaucous, diœcious, herbaceous perennial. *Rootstock* thick, branched, eventually long, aerial, covered with grey rind marked with elliptic scars of old stems; old stems not persistent; scales at the crown of the rootstock (from the axils of which the stems arise) chaffy, not well developed. *Stems* annual, several from the summit of each branch of the rootstock, erect, unbranched, leafy, smooth, round, 6–12 inches high. *Leaves* scattered, imbricate, sessile, strap-shaped to obovate, acute, rounded at base, about 1½ inch long by ¾ inch broad, flat, fleshy, glaucous, more or less toothed near the apex, larger near summit of stem. *Inflorescence* terminal, compact, convex. *Buds* subglobular. *Flowers* 4-parted, yellow or greenish yellow, shorter than the pedicels. *MALE FLOWER*.—¼ inch across; *sepals* narrow, tapering; *petals* linear, blunt, 1½ times the sepals; *stamens* slightly exceeding the petals, filaments yellow, anthers purple; *scales* conspicuous, orange, oblong, emarginate; *carpels* yellow, erect, shorter than the petals. *FEMALE FLOWER*.—*sepals* and *petals* similar, linear, greenish, sometimes flushed red; calyx-tube ½ as long as the calyx segments; *stamens* absent; *scales* as in the male; *carpels* 1½ the petals, 3 to 4 sixteenths of an inch long, greenish.

Flowers May (in gardens); about July on the mountains. Hardy.

HABITAT.—Circumpolar, ranging in its various forms from Nova Zembla and Greenland southward to the Pyrenees, Japan, and New Mexico. One of the hardiest of Sedums, capable of enduring, according to KERNER, for weeks a temperature of –10° C. without injury.

This is the well-known Roseroot, so called from the fragrant odour of the fleshy rootstocks, which is strongest when these are

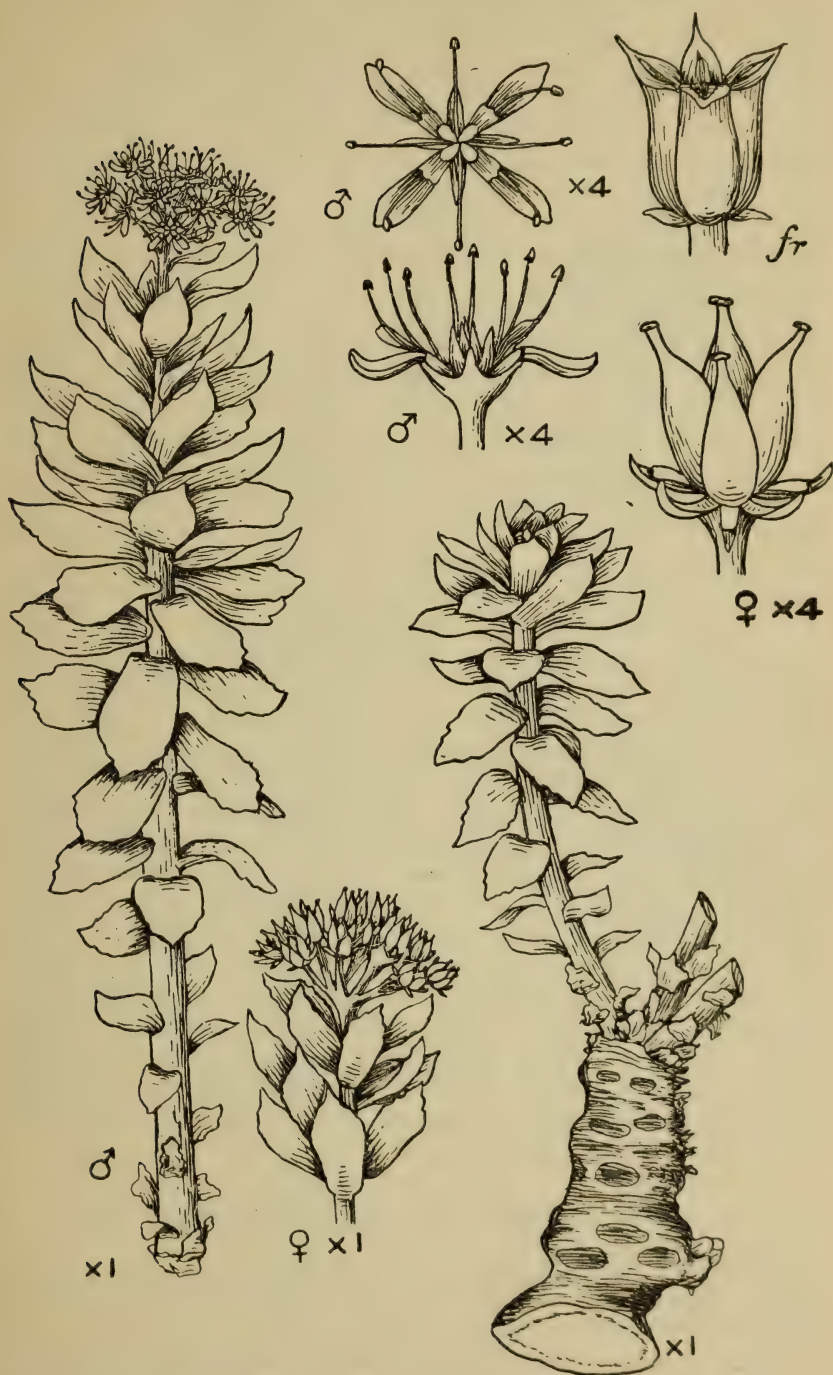


FIG. 4.—*Sedum roseum* Scopoli.

dried. It is a familiar member of the alpine flora of our own country, and is one of the most polymorphic of the variable group to which it belongs. Our native form, which is chosen for illustration (fig. 4), displays very little variation within the limits of our islands; it is sub-var. *continentalis* of MAXIMOWICZ (*Bull. Acad. Pétersb.*, 29, 129), and appears to be the form which prevails on the European mountains, spreading to Iceland and Canada. In Asia and America the plant becomes variable. REGEL and TILING ("Flor. Ajanensis," p. 88) enumerate as varieties *latifolium*, *vulgare*, *oblongum*, *viride*, *crispum*, *pumilum*, *dentatum*, *Stephani*, *humile*, *involutum*, *ovatum*, *lanceolatum*, *tenuifolium*, *Kirilowii*. While allowing *Stephani* and *Kirilowii* the rank of species, MAXIMOWICZ reduces the rest to three varietal types—*vulgare*, *elongatum*, and *atropurpureum*. The form occurring in Japan—*Tachiroi* of FRANCHET and SAVATIER—he admits as a fourth varietal type. Probably MAXIMOWICZ's arrangement goes as far as is advisable in the way of subdivision, considering the manner in which the forms run into each other.

As regards America, six "species" are described under the genus *Rhodiola* in the "North American Flora" (vol. xxii. 1905)—*rosea*, *neo-mexicana*, *alaskana*, *integrifolia*, *polygama*, and *roanensis*. I have seen only *R. rosea*, but from the descriptions the others do not seem to differ from the type more than the numerous Asiatic forms, and probably ought at most to be given varietal rank. Further exploration of the American mountain regions will no doubt reveal intermediate and additional forms.

I have got together in my garden a large series of cultivated forms, received under all kinds of names from many different sources. They show a wide range of variation:—FLOWERS—unisexual or bisexual, yellow, green, brick-red to dark purple. LEAVES—linear-oblongate to oblong or broadly obovate, entire to pectinately toothed, green to very glaucous (fig. 5, a). STEM—slender to very stout, 3 inches to a foot high. RHIZOME—forming a thick horizontal mass or elongate, very thick and knotted to slender, cylindrical, and smooth.

I have found much difficulty in allocating these and other forms, which I have been able to study, to MAXIMOWICZ's four group-varieties. In the following notes are given first the leading characters of these group-varieties according to MAXIMOWICZ's description, and then comments on the cultivated plants which I have studied, which appear to belong to them.

a. vulgare Maximowicz, *Bull. Acad. Pétersbourg*, 29, 128.

ILLUSTRATIONS.—See p. 28.

Height, 7–12 inches. *Very glaucous*. Leaves imbricate, more or less elliptic, acute. Inflorescence dense, generally leafless. *Flowers yellow*, longer than the pedicels, stamens exserted, *scales twice as long as broad*.

Here belongs the native British and Continental Roseroot, which is also the common garden form. European herbarium specimens show but little variation. The extreme glaucescence is characteristic,



FIG. 5.—*S. roseum* varieties.

but a very short leafy green form received as *Stephani* from Bremen appears to belong here; also glaucous narrow-leaved forms from Brussels, &c.

β. elongatum Ledebour, "Flor. Rossica," 2, 178 (*pro specie*).

Height, 7–12 inches. *Green* or greenish. Leaves more or less elliptic or oblong, acute or acuminate. Inflorescence dense, with bracts on the main branches. *Flowers yellow*, shorter than the pedicels. *Scales thrice as long as broad*.

The only growing plant which I can place here with any confidence came from Regel and Kesselring as *Rhodiola ovata* (fig. 5, *b*). It is a pretty slender male plant, pale green, inflorescence slightly bracteate, flowers shorter than the pedicels, sepals and petals red on back, yellow on face, stamens $1\frac{1}{2}$ times the petals, anthers buff, scales orange, thrice as long as broad, carpels green, one-third the stamens.

γ. atropurpureum Turczaninow in *Bull. Soc. Mosc.*, 13, 70 (*pro specie*).

Height, 3–7 inches. *Glaucous*, rarely greenish. Leaves elliptic, spathulate, or oblong-lanceolate, acute. *Flowers purple*, equalling the pedicels. Stamens slightly exserted. *Scales quadrate or oblong*.

MAXIMOWICZ describes the flowers as usually dark purple. The only dark purple flowers I have seen are on a female plant in the rock-garden at Kew; it has glaucous oblong-ob lanceolate leaves, and appears fairly typical of the variety. Two peculiar plants with less highly pigmented flowers appear to belong here also: a female, stems 6 inches, leaves dark, rather glaucous green, pectinately toothed, scales short, bright red, carpels purplish (fig. 6, *a*, *b*)—this came from Mr. BOWLES' garden; and a very dwarf male plant, leaves green, flowers brick-red, grown at Edinburgh under the name *Rhodiola lanceolata* (fig. 5, *c*).

δ. Tachiroi Franchet and Savatier, "Enum. Plant. Jap.," 2, 366.

Height, 3–7 inches. *Glaucous*. *Rhizome cylindrical, elongate*. Leaves imbricate, later lax, the lower elliptic subentire, the rest oblong- or linear-spathulate. Inflorescence dense, leafy. *Flowers yellow*, longer than the thick pedicels. Stamens slightly exserted. *Scales oblong, emarginate*.

This is the Japanese form of *S. roseum*. A very distinct male plant, received as *Tachiroi* from Bremen and from REGEL and KESSELRING, though quite green, agrees well with Japanese specimens of *Tachiroi* at Kew and the British Museum. These growing plants have the rhizome quite slender, cylindrical, smooth; stems many, 3–4 inches; leaves shining, green, small and obovate below, larger and oblanceolate above, where they form an involucre; inflorescence small, compact; flowers yellow; anthers pale red; scales oblong, orange; carpels small, less than half the stamens (fig. 6, *c*).



FIG. 6.—*S. roseum* varieties.

2. *Sedum heterodontum* H. f. and T. (fig. 7).

S. heterodontum Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 95, 1858; Clarke in Hooker, "Flor. Brit. India," 2, 417.

A plant of very distinct appearance, but the similarity of its floral parts to those of *S. roseum* may eventually place it as a variety of that polymorphic species, as suggested by HOOKER and others. Easily identified among the species of the *Rhodiola* section by its very short, broad, sessile, coarsely-toothed leaves, scattered along tall stems, 1-1½ foot high.

DESCRIPTION.—A dioecious herbaceous perennial. *Rootstock* thick, elongate, aerial, occasionally branched, similar to that of *S. roseum*. *Stems* annual, several together from the summit of the branches of the rootstock, erect, 1-1½ foot high, smooth, green, round, unbranched, leafy throughout. *Leaves* alternate, triangular to ovate, from a clasping base, coarsely toothed, fleshy, flat, ½-¾ inch long by about ¼ inch broad, green or glaucous, loosely disposed on the stem. *Inflorescence* terminal, dense, about an inch across, not leafy, branches very short. *Flowers* 4-merous, on very short pedicels. MALE FLOWER:—¼-⅓ inch long; *sepals* linear, blunt, distant, greenish; *petals* linear, blunt, yellowish or reddish, 1½ times the sepals, spreading; *stamens* wide-spreading, slightly exceeding the petals, filaments streaked red, anthers buff flushed red; *scales* large, half as long as the carpels, oblong or quadrate, emarginate, bright red; *carpels* erect, blunt, linear-oblong, much shorter than the stamens, equalling the sepals, about twice the scales, greenish. FEMALE FLOWER:—*petals* and *sepals* similar, of about the same length, linear, blunt, green or purplish, erect; *scales* oblong, orange, 2-3 times as long as broad, half the petals; *carpels* large, 1½-2 times the petals, erect, rather oblong, green, tipped purple, styles very short.

Flowers April-May. Hardy.

HABITAT.—Western Himalayas, 8,000-14,000 feet; Afghanistan; Tibet.

Rare in cultivation. A handsome glaucous form has been grown in the rock-garden at Kew for some years. A greener form was in Canon ELLACOMBE'S delightful garden at Bitton, and Mr. G. B. MILNE-REDHEAD of Frome has sent me a less-toothed plant. I have not heard of it elsewhere. These plants are all females except that at Kew, where both sexes are represented. One of the earliest of the *Rhodiola* section, it pushes (in Dublin) sometimes as soon as January, and never later than March. In this respect it resembles *S. Kirilowii*, and differs from *S. roseum*.

CLARKE, in Hooker's "Flora of British India," describes the leaves as "prominently white-margined." This applies to a certain degree to some of the specimens in the Kew Herbarium; none of the living plants I have seen show this character.

The specific name refers to the unequal toothings of the leaves.

3. *Sedum Kirilowii* Regel (fig. 8).

S. Kirilowii Regel in *Nouv. Mém. Soc. Nat. Moscou*, 11, 92, 1859. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 128, 1883.

The remarkable brownish-red flowered form of this species is one of the handsomest of Sedums, and is not infrequent in cultivation,

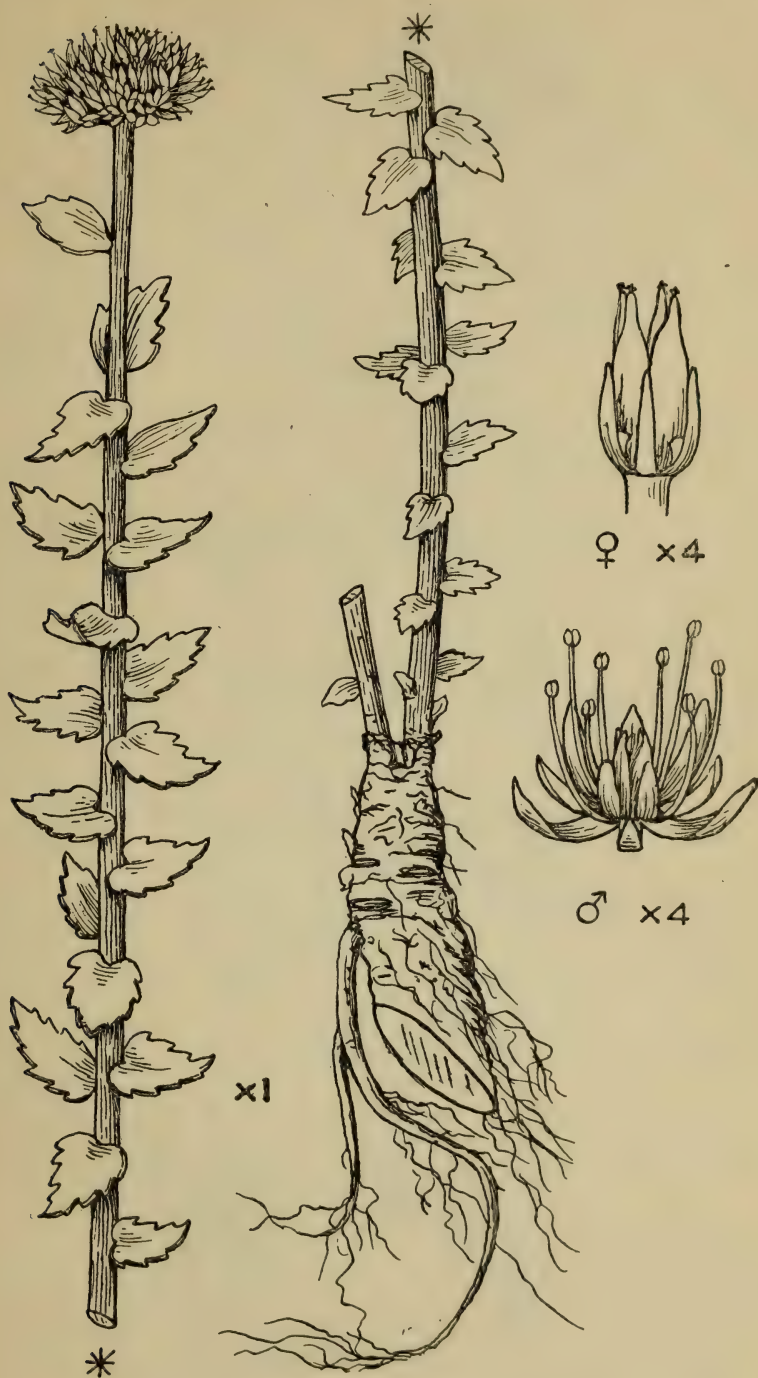
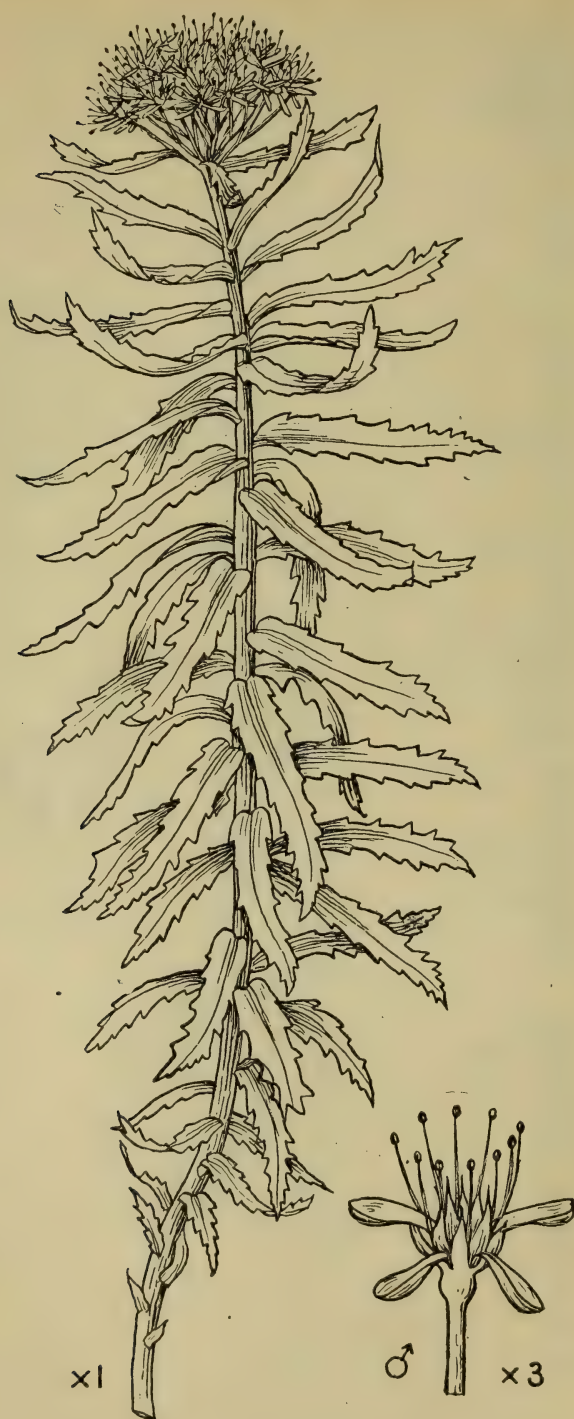


FIG. 7.—*S. heterodontum* H. f. and T.

FIG. 8.—*S. Kirilowii* Regel.

usually under the name of *S. Rhodiola linifolium rubrum*. The yellowish- or greenish-flowered type is seldom seen. Apart from "*linifolium rubrum*" I succeeded in procuring the plant, male or female, from some fourteen different sources—all garden sources—and the series shows a wide range of variation, especially as regards leaf-characters. The leaves vary from linear-attenuate to lanceolate or elliptic-oblong, the ratio of length to breadth from 12 to 1 to 4 to 1; as regards dentition, they vary from sharply toothed throughout or in upper half to entire (Fig. 9, *a*). The dark-green colour is characteristic, and only once have I seen a slightly glaucous form. The best distinguishing marks between this and the wide range of forms of *S. roseum* are the five-parted flowers and the leaves almost always broadest at the base, not near the apex.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, branched, resembling that of *S. roseum*. *Stems* annual, several from the summit of the branches of the rootstock, fewer and taller than in *roseum*, erect, pale green, smooth, round, unbranched, a foot high or more; barren stems absent. *Leaves* green, rather thin, tapering or oblong, almost always widest at the base, sessile, acute, usually about 1 to 1½ inch long by ¼ inch broad, sharply and irregularly toothed mostly near the apex or rarely entire, usually set at right angles to the stem, flat or recurved. *Inflorescence* a dense terminal cyme, naked or leafy or involucrate. *Flowers* 5- (sometimes 4-) parted, small, greenish yellow. *MALE FLOWER*:— $\frac{3}{8}$ inch long by $\frac{5}{16}$ inch across, shorter than the pedicel; *sepals* linear, green; *petals* slightly exceeding the sepals, wide-spreading, linear-lanceolate or linear-obovate, greenish; *stamens* exceeding the petals, greenish; *scales* large, oblong, emarginate, yellow; *carpels* small, erect, slender, green, equalling the petals. *FEMALE FLOWER*:—*sepals* and *petals* similar, linear, small, erect; *stamens* absent; *scales* as in the male; *carpels* slightly spreading, 1½ times the sepals and petals.

Flowers April-May. Hardy.

HABITAT.—Himalaya, Turkestan, Mongolia, north China.

Var. *rubrum* nom. nov.

SYNONYMS.—*S. Rhodiola* var. *linifolia* Regel and Schmalh. in "Acta Hort. Petrop.," 5, 583. *S. linifolium rubrum* or *S. Rhodiola linifolium rubrum* of gardens.

ILLUSTRATIONS.—Regel, "Gartenflora," t. 1080. *Trans. Russ. Hort. Soc.*, 1863, t. 129.

Usually stouter than the type, leaves elongate, not much toothed, inflorescence very dense, generally leafless, flowers rich brown-red, with bright orange scales.

Occurs both as male and female, the male being the commoner in cultivation, and much the more showy. In some male plants the colouring is deeper, of a purplish tinge.

In the relative length of the different parts of the flower, the species is somewhat variable, and between the yellow-flowered type and the red variety colour-intermediates occur. I have pale orange forms, and one handsome plant has petals, sepals, anthers, and carpels yellow, scales and filaments deep red.

The plant commences to flower long before the stem is fully grown, especially in the case of var. *rubrum*. Fig. 9 represents a stem in this condition.

Named after IVAN KIRILOV, Russian botanist.

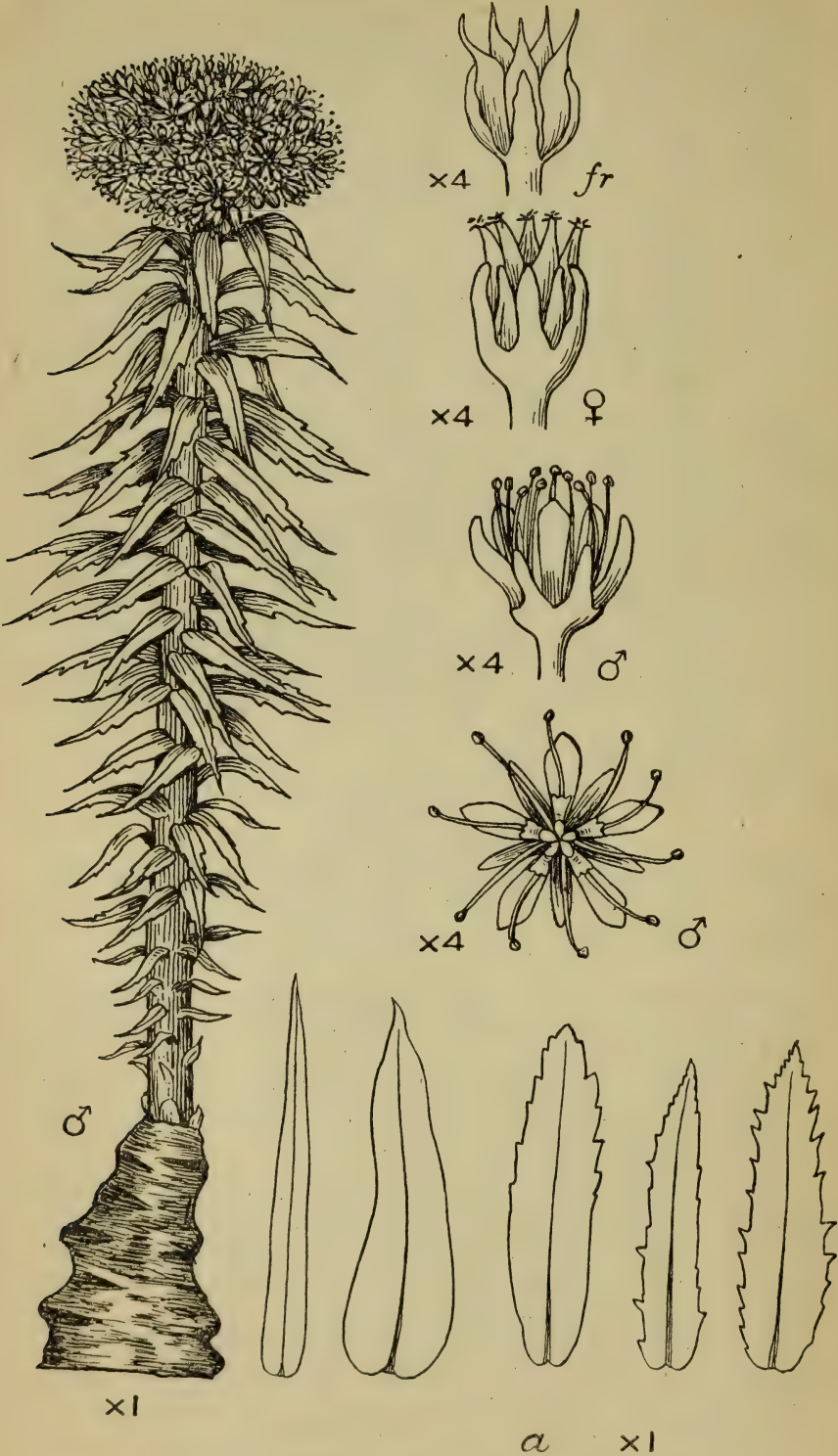


FIG. 9.—*S. Kirilowii* Regel.

4. *Sedum longicaule* Praeger (fig. 10).

S. longicaule Praeger in *Journ. of Bot.*, 54, 39, 1917.

A dioecious *Rhodiola* of remarkable stature, characterized by its very tall stems (2-3 feet long) clothed with long tapering entire leaves, which diminish towards the base of the stem into minute scales. It most resembles a much overgrown *S. Kirilowii*, but the leaves and stems are twice as long, and the flowers (of which the female alone is known) present points of difference.

DESCRIPTION.—A glabrous herbaceous perennial, without barren shoots. *Rootstock* massive, resembling that of *S. Kirilowii*. *Stems* 2-3 feet long, erect, round, smooth, reddish, unbranched, $\frac{1}{4}$ inch thick, clothed with leaves throughout. *Leaves* alternate, many, 2-3 $\frac{1}{2}$ inches long, $\frac{1}{4}$ inch wide at base, sessile, entire, linear-elongate, rounded or auricled at the base, tapering to an acute point, inserted at right angles to the stem; on face dark green with a whitish midrib, on back pale and rather glaucous with the midrib very prominent; smaller and fewer near the inflorescence; decreasing in size towards the rhizome till they become mere minute scales. *Inflorescence* about 2 inches across, flattish or convex, dense; bracts few, narrow. FEMALE FLOWER:—mostly 5- (frequently 6-, sometimes 4- or 7-) parted; *calyx* cup-shaped, fleshy, green, the lobes distant, tapering, fleshy, blunt, about equalling the tube; *petals* erect, linear-tapering, distant, blunt, green, subterete, 1 $\frac{1}{2}$ times the sepals; *scales* small, red-purple, slightly longer than broad, rounded at apex, less than $\frac{1}{2}$ the sepals; *carpels* green, stout, about twice the petals, with very short spreading styles.

Flowers June. Hardy.

HABITAT.—Unknown, but to judge from its affinities central or eastern Asia. I found the plant in the garden of Mr. H. J. ELWES, F.R.S., who is not certain whence it was obtained. Very possibly it originated from seed collected by one of the recent explorers of western China. The male plant is as yet unknown.

The plant half-grown, with its narrow leaves with white midribs, has much the appearance of some of the *Euphorbias*. Named from its remarkably tall stem.

5. *Sedum rotundatum* Hemsley (fig. 11).

S. rotundatum Hemsley in *Kew Bulletin*, 1896, 210.

ILLUSTRATION.—Hooker, "Icon. Plant.," tab. 2469.

A species well marked by its robust growth, broad round entire leaves, and red stems and flowers, combined with a characteristic thick *Rhodiola* rootstock. The long linear claw of the petal below the insertion of the stamen is peculiar and unusual.

DESCRIPTION.—A smooth herbaceous perennial. *Rootstock* very thick, erect, elongate, blackish, clothed (at least in nature) with the blackish straw-like remains of old stems. *Stems* several, rather stout, simple, erect, about 6 inches high, $\frac{1}{2}$ inch thick, bright red especially below. *Leaves* broadly obovate to orbicular, entire, rounded at apex, very shortly stalked, about 1 $\frac{1}{2}$ inch long by 1 inch broad, dark green with a silvery sheen. *Inflorescence* lax, rather few-flowered. *Flowers* usually 5-parted, dark red. MALE FLOWER:—*sepals* ovate-oblong to deltoid, blunt, free part $\frac{1}{2}$ inch long; *petals* $\frac{1}{2}$ - $\frac{3}{4}$ inch long, linear below the insertion of the stamens, oblong blunt above that point; *stamens* $\frac{1}{4}$ inch long, the epipetalous ones adnate in lower third; *scales* roundish-quadrate *carpels* $\frac{1}{2}$ - $\frac{3}{4}$ inch long, yellowish, with short styles.

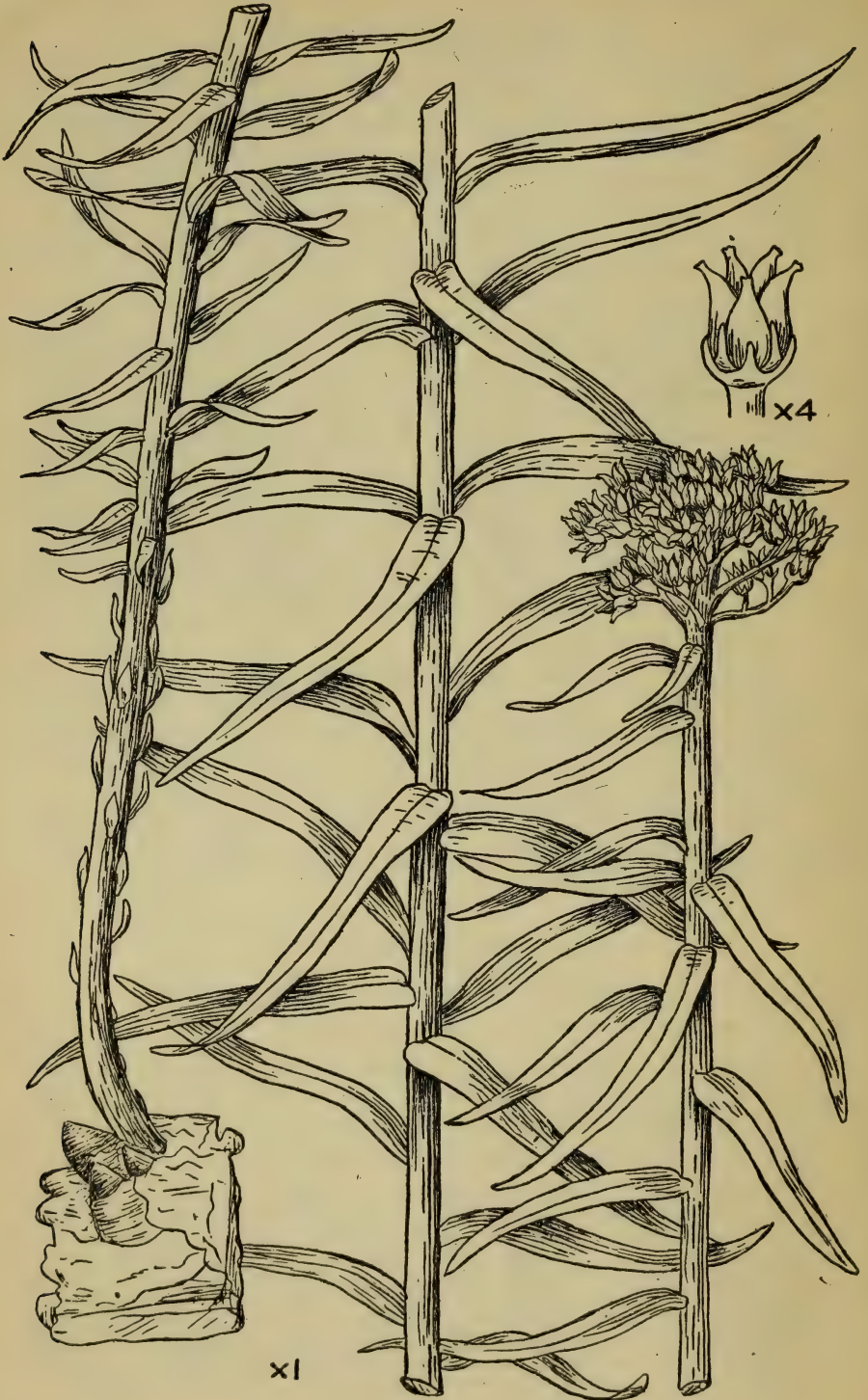


FIG. 10.—*S. longicaule* Praeger.

Flowers June. Hardy.

HABITAT.—Himalayan region; Yunnan.

This species has been in cultivation for some years, as at Kew, Edinburgh, Glasnevin, and Bees nursery at Chester, but it seems to be not a good doer in cultivation (though a very robust plant in

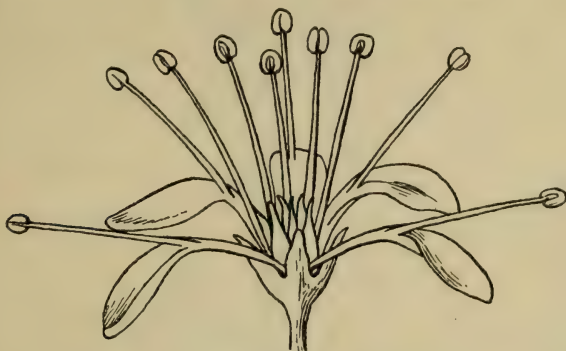


FIG. 11.—*S. rotundatum*. Male flower. $\times 5$.

the wild state), and it was only when this paper was at press that I at last saw flowers (at Edinburgh). The plants in cultivation were derived from seed collected by F. Kingdon Ward (No. 764), G. Cave (No. 1456), and G. Forrest (no number).

Named from its round leaves.

6. *Sedum elongatum* Wallich (fig. 12).

S. elongatum Wallich Catalogue, No. 7233, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 98, 1858. Clarke in Hooker, "Flor. Brit. India," 2, 419.

A peculiar *Rhodiola*, which in its tall growth and broad leaves recalls *S. Telephium* and its allies; but it is at once distinguished from these by its characteristic *Rhodiola* rhizome, its stems produced from the axils of broad scales, its globular buds, and its dioecious black-purple flowers with very conspicuous scales forming a cup round the carpels. Its broad leaves and large scales will identify it from among the other *Rhodiolas* found in cultivation.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* very fleshy, branched, growing points furnished with scales. *Stems* annual, arising from the axils of the older scales, erect, simple, leafy, round, smooth, 1–1½ foot high. *Leaves* alternate, sessile or very shortly stalked, obovate or elliptic, about 2 inches long by ¾ to 1 inch broad, often largest near the top of the stem, becoming minute at the base, more or less toothed, very smooth, green with a pale midrib, pale below. *Inflorescence* terminal, large, loose, leafy, its branches rather long, slightly pubescent. *Buds* globular, purple mottled with green. *Flowers* dark reddish-purple, nearly ⅜ inch across, on slender pedicels longer than the flowers. **MALE FLOWER**:—*sepals* narrow, tapering, rather acute, purple; *petals* obovate-oblong, blunt, spoon-shaped at apex, dark purple, wide-spreading, 1½ times the sepals; *stamens* purple, slightly shorter than the petals; *scales* very broad, contiguous, emarginate, forming a deep purple shining cup round the carpels; *carpels* short, lightly exceeding the scales, erect, dull purple.

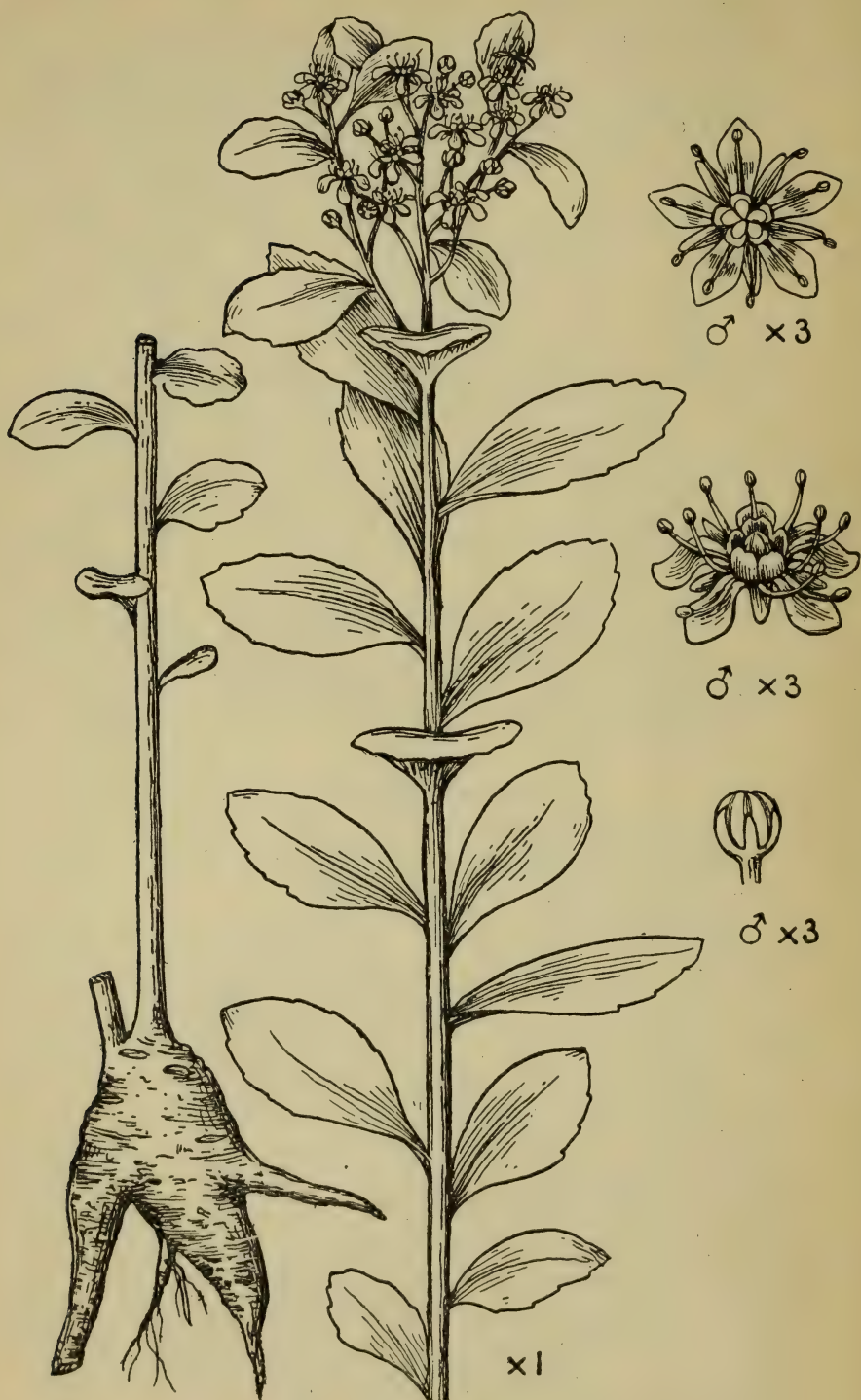


FIG. 12.—*S. elongatum* Wallich.

Flowers June. Hardy.

HABITAT.—Widely spread in the Himalayas, 10,000–12,000 feet.

Apparently less variable than most of the Himalayan *Rhodiolas*, but I have not seen many plants. Collected roots were received from the Lloyd Botanic Garden, Darjeeling, on two occasions, and I have also had plants from Edinburgh. I have not seen female flowers. Like many of the species of the *Rhodiola* and *Telephium* sections it does not like a very dry situation.

Named from its long stem, unusually tall for a *Rhodiola*.

7. *Sedum bhutanense* Praeger *nom. nov.* (figs. 13, 14).

SYNONYM.—*S. Cooperi* Praeger in *Journ. of Bot.*, 57, 49, 1919.

This plant resembles in stem and leaf a slender *S. elongatum* Wall., while it also recalls *S. bupleuroides* Wall. It differs from the former in its stem only half as thick, smaller leaves less distinctly stalked or sessile, less leafy inflorescence, flowers only half as large, more densely arranged on the branches, petals much narrower above, &c. *S. bupleuroides* has very different leaves, entire, quite sessile, and shorter, a laxer inflorescence, flowers half as large again, smaller scales, &c.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* massive, erect, branching, crowned with entire broadly ovate-deltoid acute scales up to $\frac{3}{8}$ inch long, green when young, brown and chaffy when old. *Stems* several, simple, slender, erect, smooth, round, leafy throughout, 1–2 feet high, $\frac{1}{8}$ inch thick or less. *Leaves* alternate (or sub-ternate or sub-opposite), glabrous, longer than the internodes, sessile or very shortly stalked, scarcely fleshy, obovate or elliptic, rather distant, toothed above or nearly entire, rounded or pointed at apex, about $1\frac{1}{2}$ inch long, $\frac{3}{4}$ inch broad in middle of stem, becoming smaller above and very small below, dark green with a whitish midrib, whitish below. *Inflorescence* terminal, lax, up to 2–3 inches long and broad, of several flat-topped, forked, mammillate branches bearing a few leaf-like bracts. *Buds* sub-globular. *Flowers* dioecious, usually 4- (sometimes 5- or 6-) parted. *MALE FLOWER*:—*sepals* green or purple, linear, fleshy, blunt, free nearly to the base; *petals* oblong-ob lanceolate, blunt, concave, generally purple, patent or reflexed, $1\frac{1}{2}$ times the sepals, $\frac{1}{12}$ inch long; *stamens* equalling the petals, wide-spreading, filaments purple, anthers reddish; *scales* large, shining purple, erect, spreading and broader above, truncate-retuse-emarginate at apex, about $\frac{1}{2}$ the petals; *carpels* very small, blunt, greenish or purplish, much shorter than the scales. *FEMALE FLOWER*:—*sepals* as in male; *petals* spreading, resembling and equalling or exceeding the sepals; *scales* as in male, slightly exceeding the sepals and petals; *carpels* erect, lanceolate, green or purple, $\frac{1}{4}$ to $\frac{1}{2}$ longer than the sepals and petals, with short, stout, straight, capitate purple styles.

Flowers May. Hardy.

HABITAT.—Himalaya; Yunnan.

Seed of this species from Bhutan, 13,000 feet (Cooper, No. 3517), was apparently widely distributed. I saw young plants at Kew, Edinburgh, Glasnevin, and the Bees Nursery near Chester, and grew plants from all four places. Female plants predominated largely. When the leaves are pseudo-ternate, the plant somewhat resembles a slender *S. yunnanense* Franchet, except for the inflorescence.

At first named after its discoverer, Mr. R. E. COOPER, who obtained it when collecting for Bees, Ltd., in 1913, but the name *S. Cooperi* is already occupied.



FIG. 13.—*S. bhutanense* Praeger.

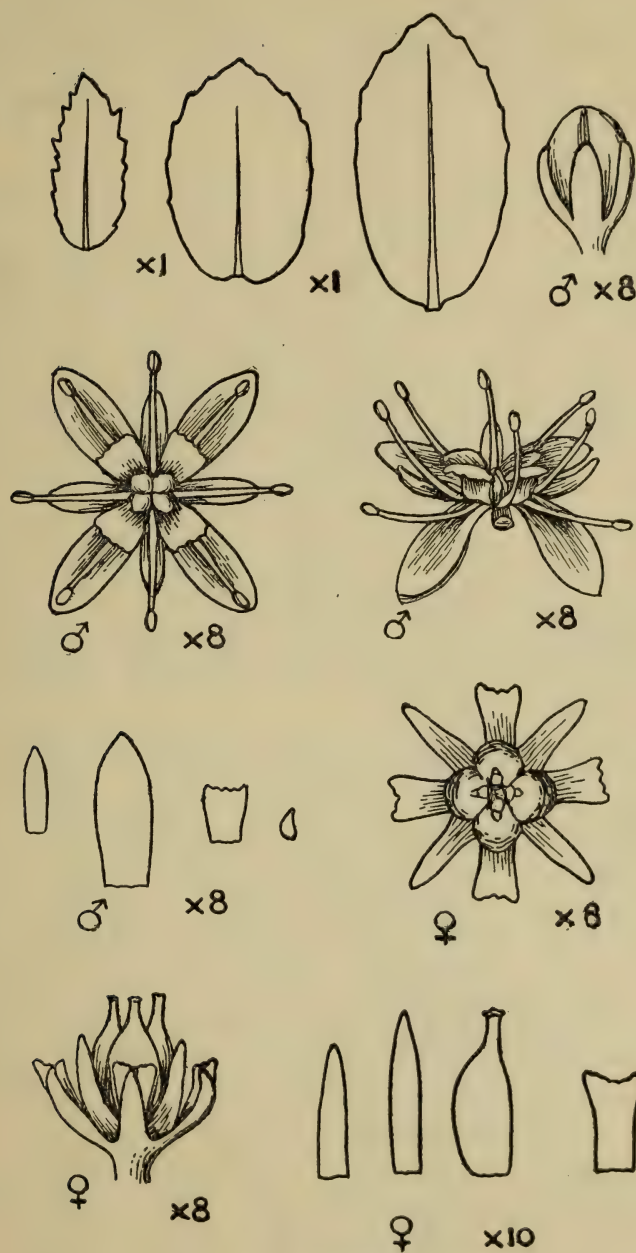


FIG. 14.—*S. bhutanense* Praeger.

8. *Sedum purpureoviride* Praeger (fig. 15).

S. purpureoviride Praeger in *Journ. of Bot.*, 54, 40, 1917.

An interesting species, readily diagnosed by the glandular-pubescence of the stem and of the under-side of the oblong-lanceolate greyish-green toothed leaves, and by its purple and green usually diœcious flowers.

DESCRIPTION.—A diœcious (sometimes hermaphrodite) herbaceous perennial. *Rootstock* erect, thick (about $\frac{1}{2}$ inch diameter), branched, aerial. *Stems* several from the summit of the rootstock, erect, annual, unbranched, 8–12 inches long, leafy throughout, round, whitish, densely pubescent with short glandular hairs; barren stems absent. *Leaves* many, alternate, patent or reflexed, increasing in size from base to apex of stem, up to 1 inch long by $\frac{1}{2}$ inch wide, narrowly oblong-lanceolate, rather acute, sessile, rounded at base, edges lightly toothed and reflexed, upper surface glabrous, of a dull dark greyish-green with a pale midrib, lower surface pale, glandular-pubescent especially on the much-raised midrib. *Inflorescence* a rather dense umbellate cyme, leafy, many-flowered, 1–1 $\frac{1}{2}$ inch across, surface convex; becoming concave, lax, and very leafy before fading, owing to growth of the branches and leaf-like bracts. *Buds* obovate to sub-globular, angular, rather apiculate. *Flowers* mostly 5-parted; pedicels slender, twice as long as the buds, very glandular. **MALE FLOWERS**:— $\frac{3}{8}$ inch across; *sepals* oblong-lanceolate, blunt, fleshy, green, wide-spreading, forming an open cup; *petals* linear-oblong-lanceolate, blunt, very concave on face both longitudinally and transversely, patent or somewhat reflexed, green with a purple base, twice the sepals; *stamens* ascending, equalling or slightly exceeding the petals, filaments purple, anthers pale orange-red; *scales* large, purple, arching, the tips deflexed, convex on face both longitudinally and transversely, emarginate, twice as long as broad, slightly wider upwards; *carpels* very small, erect, dark green. **HERMAPHRODITE FLOWER**:—similar to the male as regards size and shape of *sepals*, *petals*, *stamens*, and *scales*; *carpels* erect, green, the slender styles occupying nearly half their length, slightly shorter than the stamens.

Flowers May. Hardy.

HABITAT.—Yunnan, where it has been collected several times (for particulars see *Journ. of Botany*, 54, 40, 1917). All the available material belongs to male plants, with the exception of one specimen in the Edinburgh Herbarium, which is hermaphrodite. My description is drawn up mainly from living plants received from Edinburgh several years ago, under the name "*Sedum* sp. Yunnan, Forrest," which began to flower with me in 1916. No further particulars relative to these specimens are available. The drawings are made from the living plant, excepting those of the hermaphrodite flower which is from the Edinburgh specimen referred to above.

Named from the colour of its flowers.

9. *Sedum bupleuroides* Wallich (fig. 16).

S. bupleuroides Wallich Catalogue, No. 7229, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 98. Clarke in Hooker, "*Flor. Brit. India*," 2, 418.

A very distinct plant, with the characteristic, much-thickened rootstock and unisexual flowers of *Rhodiola*; they are dark red-purple and small. *S. bupleuroides* shows a smaller range of variation than the majority of the *Rhodiolas*, and is generally immediately

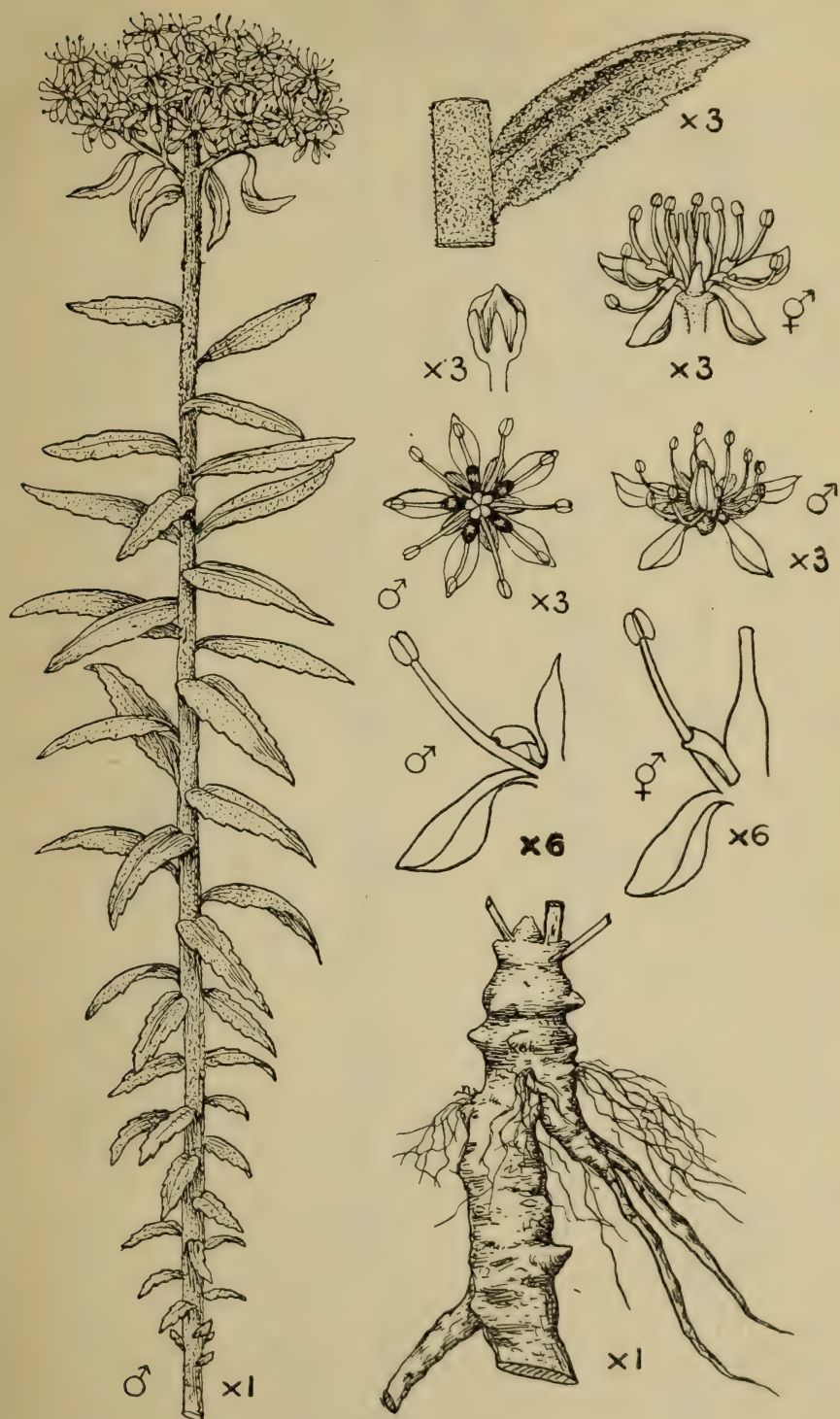


FIG. 15.—*S. purpureoviride* Praeger.

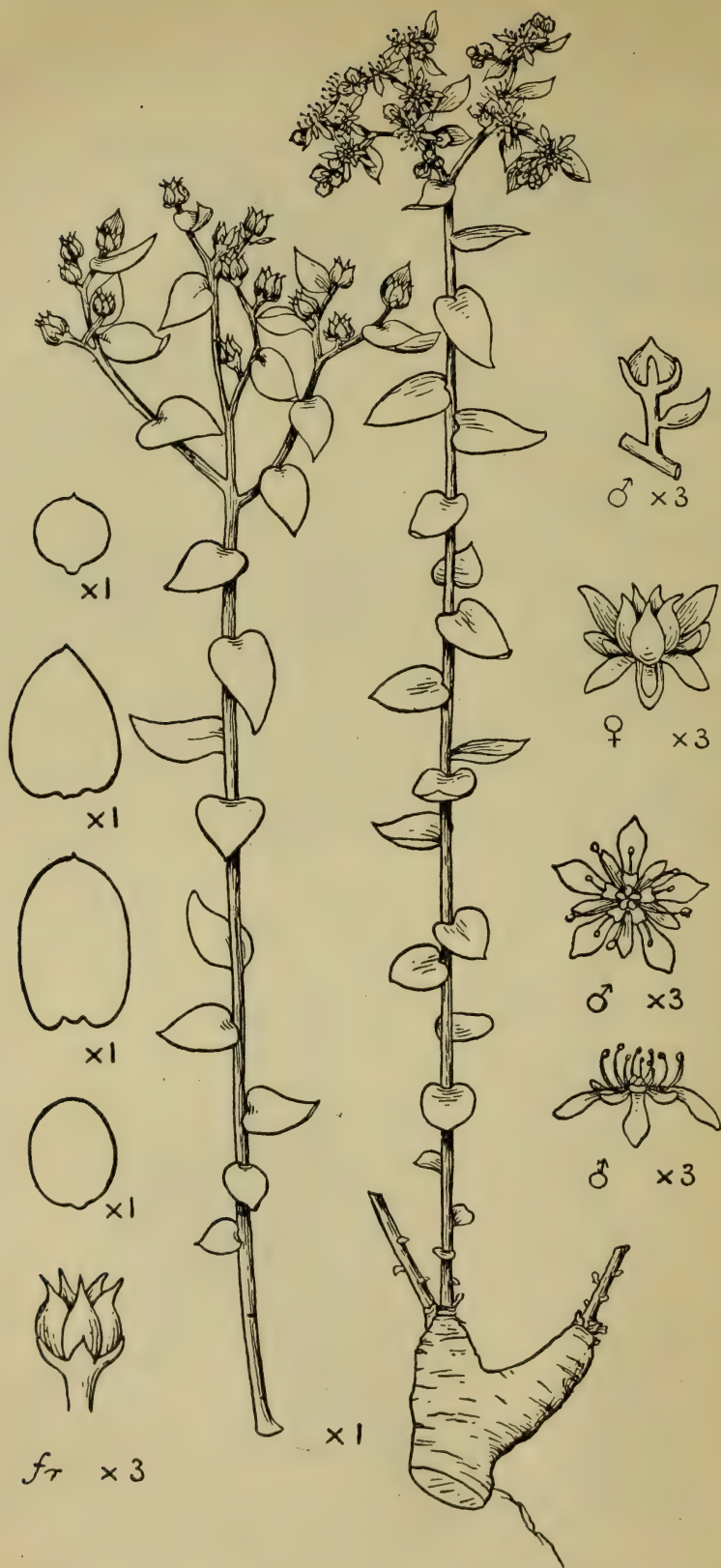


FIG. 16.—*S. bupleuroides* Wallich.

recognizable by its entire heart-shaped leaves, which vary chiefly as regards their length.

DESCRIPTION.—A glabrous herbaceous perennial without barren shoots. *Rootstock* massive, branched, the greater part subterranean (in cultivation). *Stems* annual, erect, several together, 9–12 inches long, slender, smooth, unbranched. *Leaves* alternate, rather distant, fleshy, triangular-ovate, ovate, or ovate-lanceolate, acute or blunt, sessile, cordate, $\frac{1}{2}$ –1 inch long by $\frac{1}{4}$ – $\frac{1}{2}$ inch or more broad, green, paler on back, tip often red. *Inflorescence* a flat, lax, leafy cyme, 1–3 inches across. *Buds* obovate or nearly globular, blunt or apiculate, ribbed, the clasping sepals occupying grooves between the petals. *Flowers* 5-parted, $\frac{1}{2}$ inch across. MALE FLOWER :—*sepals* linear, streaked dark purple outside, greenish or purple inside, tube short; *petals* $1\frac{1}{2}$ times the sepals, oblanceolate, non-contiguous, spreading, often reflexed, dark brownish purple or streaked purple and green; *stamens* reddish purple, shorter than the petals; *scales* conspicuous, dark shining purple, quadrate, often retuse, reflexed; *carpels* minute, erect, greenish, equalling the scales. FEMALE FLOWER :—*sepals* similar to the male; *petals* more linear; *stamens* absent; *scales* similar to the male; *carpels* large, purple, with short, blunt, linear spreading styles.

Flowers June. Hardy.

HABITAT.—Himalayas, 10,000–12,000 feet.

Rare in cultivation. I have it from Kew, Edinburgh, and the Lissadell nursery in Co. Sligo, all these plants having their origin in the Darjeeling Botanic Garden, whence I have also received it direct. It also came from Messrs. HOUSE & SON of Bristol under the name of *S. Hookeri*. The male plant (which is much the more attractive) is commoner in cultivation than the female, which I have seen at Edinburgh, and have raised from Darjeeling seed.

The specific name recalls the resemblance of the plant to some species of *Bupleurum*, a peculiar genus of Umbelliferae.

Group 2. HIMALENSES.

10. *Sedum tibeticum* Hooker fil. and Thomson (fig. 17).

S. tibeticum H. f. and T. in *Journ. Linn. Soc., Bot.*, 2, 96, 1858. Clarke in Hooker, "Flora Brit. India," 2, 478.

A Himalayan *Rhodiola* which in appearance comes nearest to *S. himalense* D. Don, but it is usually glaucous and smooth, while *himalense* is mostly dark green and rough on leaf and stem. *S. tibeticum* also belongs to the group which has the inflorescence branches bare of leaves, while those of *himalense* are leafy. Both have usually dark-purple flowers, and are much slenderer than *S. roseum*, and much larger than *S. fastigiatum*.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, erect, branched. *Stems* many, from the scales at apex of rootstock, annual, simple, smooth, round, reddish, slender, leafy, 6–9 inches long. *Leaves* alternate, longer than the internodes, patent, sessile, lanceolate to oblong, rounded at base, acute, mostly lightly toothed in upper part, generally rather glaucous, pale on back, about $\frac{3}{4}$ inch long. *Inflorescence* terminal, flattish, rather lax, 1–2 inches across, leafless or with few bracts at base of branches; branches several, forked. *Flowers* dark purple, $\frac{3}{8}$ inch across. FEMALE FLOWER :—*calyx* saucer-shaped, purple or green, lobes long-triangular, rather acute, exceeding the tube; *petals* lanceolate, acute, nearly twice the sepals, dark purple, wide-spreading; *scales* black-purple, oblong, blunt, erect, equalling or exceeding in length and breadth the sepals which cover their backs; *carpels* erect, oblong, equalling the petals, $\frac{3}{8}$ inch long, purple, the tips and the very short styles divergent.

FIG. 17.—*S. tibeticum* H. f. and T.

Flowers June-July. Hardy.

HABITAT.—Himalayan region.

Very rare in cultivation. Received from Lissadell Nursery (where it was raised from Darjeeling seed labelled *S. fastigiatum*); also from Edinburgh Botanic Garden unnamed, collected by Captain BAILEY on the Upper Brahmaputra. The former plants were male, the latter female. The male flowers were imperfect, and are not described here.

11. *Sedum quadrifidum* Pallas.

S. quadrifidum Pallas, "Reise," 3, 730, 1776. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 97. Clarke in Hooker, "Flor. Brit. India," 2, 418.

SYNONYM.—*S. coccineum* Royle, "Illustr. Bot. Himalayas," 223.

ILLUSTRATIONS.—Pallas, *loc. cit.* tab. 6, fig. 1. Royle, *loc. cit.* tab. 48, fig. 3.

In nature a smaller plant than any other *Rhodiola* in cultivation, with a caudex densely clothed with the fine wiry black stems of former years. In cultivation larger, but still smaller than any of the other species, with linear acute leaves about $\frac{1}{2}$ inch long and small few 4-parted flowers. The only specimens seen in cultivation were house-grown and still young, so only a brief description is given, helped out by Hooker's "Flora of British India."

DESCRIPTION.—A usually glabrous herbaceous perennial. *Rhizome* rather stout, elongate, in nature densely clothed with the black wiry old stems. *Stems* 6 inches (in nature more often 2 inches) long, erect, simple, leafy. *Leaves* linear, acute, flattened, about $\frac{1}{2}$ inch long by $\frac{1}{8}$ inch wide. *Inflorescence* 1- to 3-flowered. *Flowers* 4- or 5-parted. MALE FLOWER:—*petals* linear-lanceolate, blunt, wide-spreading, white in the living specimens, usually purple, at least twice the sepals; *stamens* erect, equalling the petals; *scales* oblong, notched, red; *carpels* lanceolate, erect, yellow, with short styles.

Flowers June. Hardy.

HABITAT.—Himalayan region, Siberia, Arctic Russia.

Young plants, raised from seed sent from Darjeeling, seen at Edinburgh as the present paper was going to press. Apparently not previously in cultivation, though a characteristic Himalayan and Siberian species.

Named from its (usually) quadripartite flowers.

12. *Sedum himalense* D. Don (fig. 18).

S. himalense D. Don, "Prodromus Flor. Nepalensis," 212, 1825. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 97. Clarke in Hooker, "Flor. Brit. India," 2, 418. Not *S. himalense* of many gardens, which is *S. Douglasii* Hooker, a plant of N.W. America, not related to the *Rhodiolas*.

Among cultivated Sedums this species most resembles, in general appearance, *S. tibeticum* Hooker f. and Thomson, but it differs from it in bearing bracts on the branches of the inflorescence; the leaves are dark green and the stems mostly red, and both are roughish,

while in *S. tibeticum* they are quite smooth and the leaves often somewhat glaucous. The few plants of both species which I have

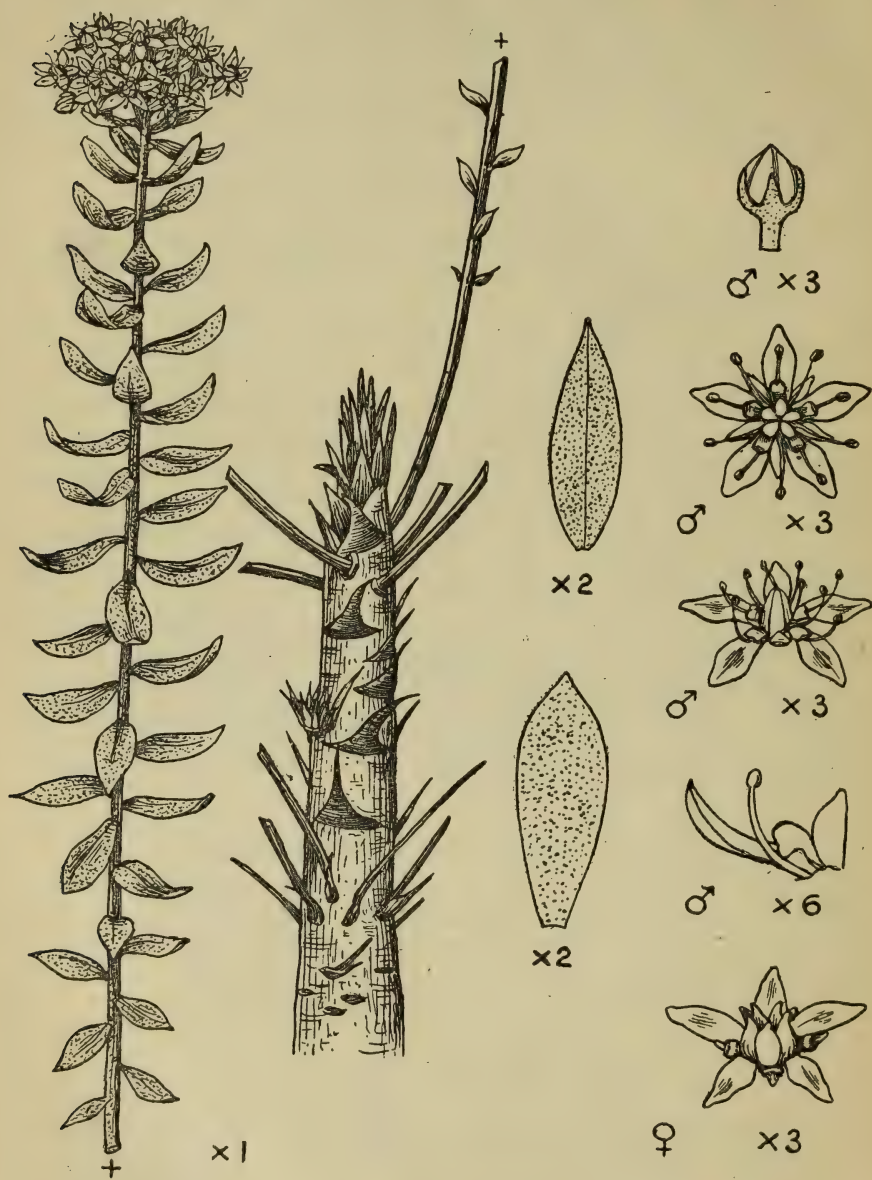


FIG. 18.—*S. himalense* Don.

seen were not hard to distinguish, but Hooker states that in the Himalayas these and the other native *Rhodiolas* vary much in almost every character, so from a few specimens one cannot dogmatize about them.

DESCRIPTION.—An herbaceous perennial, usually with stem and leaves somewhat rough. *Rootstock* thickened, elongate, armed with the bases of the old stem, and crowned with conspicuous scale-leaves. *Stems* arising from the axils of the older scales, erect, slender, round, usually reddish, leafy throughout, 6–12 inches long, mostly rough with many transparent bead-like glands. *Leaves* alternate, sessile, loosely imbricate, flat, slightly fleshy, lanceolate to oblanceolate or obovate or oblong-oblanceolate, acute to apiculate, or obtuse, rounded at base, toothed near apex or entire, finely papillose especially on the edges, $\frac{5}{8}$ to 1 inch long, $\frac{3}{16}$ to $\frac{5}{16}$ inch broad, dark green, paler below, midrib rather prominent on under-side. *Inflorescence* leafy, not dense, usually small in cultivation. *Buds* almost globular. *Flowers* dark purple, $\frac{1}{4}$ inch across, pedicels slender, thickened upwards, longer than the flowers. **MALE FLOWER** :—*calyx* lobes tapering from a broad base, rather acute, fleshy, purple, equalling the green tube; *petals* oblong-lanceolate, blunt, patent, twice the calyx, red and yellowish inside (fading purple), deep red-purple outside; *stamens* $\frac{2}{3}$ the petals, ascending, filaments red or purple, anthers deep red; *scales* large, broadly cuneate, rounded or emarginate above, recurved, deep purple; *carpels* small, short, erect, purplish. **FEMALE FLOWER** :—*sepals*, *petals*, and *scales* as in male; *stamens* absent; *carpels* stout, erect, with very short diverging styles.

Flowers May–June. Hardy.

HABITAT.—Widely spread along the Himalayas, 12,000–17,000 feet.

Very rare in cultivation. Through the good offices of the Botanical Survey of India, I received very fine collected rhizomes, a foot in length and nearly 3 inches in girth. Specimens from Edinburgh, labelled *S. humile*, were received there from Calcutta, and an unnamed plant at Edinburgh, collected by Captain BAILEY on the Upper Brahmaputra, proved to be a female *S. himalense*—the only one I have seen.

Named after its habitat.

13. *Sedum fastigiatum* Hooker fil. and Thomson (fig. 19).

S. fastigiatum H. f. and T. in *Journ. Linn. Soc., Bot.*, 2, 98, 1858.
Clarke in Hooker, "Flor. Brit. India," 2, 419.

A typical Himalayan *Rhodiola*, and like most of them variable in flower as regards size and colour of parts. Allied to *S. himalense* and *S. tibeticum*, in both of which, however, the leaf is broader and much thinner in proportion to its length. In *S. himalense*, moreover, the leaves are usually rough, and in *S. tibeticum* usually glaucous; the small, narrow, fleshy, dark green shining leaves of *S. fastigiatum* will separate it from either at a glance. The leaves of *S. dumulosum* Franchet are somewhat similar to those of the present species, but *dumulosum* has erect petals forming white bell-shaped flowers. *S. quadrifidum* comes nearest to *S. fastigiatum*, but has smaller flowers and fruit.

DESCRIPTION.—An herbaceous glabrous perennial. *Caudex* elongate, thick, branched. *Stems* many, from the summit of the branches, simple, erect, leafy, smooth, round, 3–6 inches long, the old ones persistent. *Leaves* alternate, crowded, linear-oblong to lanceolate, blunt, sessile, dark green, smooth, shining, fleshy, rounded on face, flat or concave on back, $\frac{1}{2}$ – $\frac{1}{3}$ inch long. *Inflorescence* smallish, compact, bearing leaves on the branches, $\frac{1}{4}$ to 1 inch across. *Buds* ovate, blunt. *Flowers* $\frac{1}{4}$ inch long, $\frac{1}{4}$ inch across, exceeding the pedicels, 4- or 5-parted, narrow, cup-shaped. **MALE FLOWER** :—*sepals* linear to long-triangular, blunt, tube short; *petals* broadly lanceolate, blunt, $1\frac{1}{2}$ times the sepals; *stamens*



FIG. 19.—*S. fastigiatum* H. f. and T.

spreading, twice the sepals; *scales* conspicuous, quadrate, more or less retuse *carpels* nearly equalling the petals, slender, erect, slightly divergent above. FEMALE FLOWER:—*sepals* long-triangular to oblong, blunt, tube short; *petals* linear, blunt, $1\frac{1}{2}$ times the sepals; *scales* $\frac{2}{3}$ the sepals, strap-shaped, emarginate, reflexed; *carpels* very erect, slightly longer than the petals.

Flowers May–June. Hardy.

HABITAT.—Himalayan region; western Yunnan.

The flowers vary in colour. My male plant is a white-flowered form—sepals dark purple with a green tube, petals and filaments white, anthers purple, scales orange, carpels green—a very bright little flower. Dried specimens at Kew appear to have the same coloration, but purple throughout the flower seems to be more usual. My female plant has flowers of a deep red-purple, the carpels and scales of a deeper tint than the petals, the sepals green. Plants collected in Yunnan by FORREST had pale lemon-yellow flowers, others greenish.

Not recorded as in cultivation. The male plant came to me from Lissadell nursery as *S. quadrifidum*, where it was raised from Darjeeling seed. The female was sent to Kew from Hexham-on-Tyne, where it grows in a school garden, and is supposed to have been found wild in Cornwall or Scotland!

Series II. CRASSIPEDES.

14. *Sedum crassipes* Wallich (figs. 20, 21).

S. crassipes, Wallich Catalogue, No. 7234, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 99.

SYNONYMS.—*S. asiaticum* Clarke ex Hooker, "Flor. Brit. India," 2, 419. Masters in *Gard. Chron.*, 1878, ii. 267. (Not of De Candolle, "Prodromus," 3, 401, 1828.) *S. Wallichianum* Hooker, "Icon. Plant.," tab. 604. ILLUSTRATION.—Hooker, *loc. cit.*

A very distinct plant, at once recognized among the *Rhodiolas* by its linear toothed bright-green leaves and greenish-white flowers.

DESCRIPTION.—A smooth herbaceous perennial. *Rootstock* thick, elongate, branched, aerial, $\frac{1}{4}$ – $\frac{3}{8}$ inch diameter, bearing withered bases of old stems. *Stems* several from each crown, smooth, round, erect, unbranched, 6–12 inches high. *Leaves* many, alternate, bright green, glabrous, $\frac{1}{2}$ – $\frac{3}{4}$ inch long by $\frac{1}{16}$ – $\frac{1}{8}$ inch broad, flat, fleshy, linear to lanceolate, sessile, pointed at both ends, with 1 to 3 remote teeth on either side in the upper half. *Inflorescence* terminal, dense, flattish, an inch across, leafy with leaf-like bracts. *Buds* oblong, bluntly pointed, $\frac{3}{16}$ – $\frac{1}{4}$ inch long. *Flowers* $\frac{1}{2}$ inch across when wide open, 5-parted, hermaphrodite. *Sepals* green or purple, subulate, blunt, wide-spreading. *Petals* yellowish-white to greenish, linear, acute or blunt, boat-shaped, mostly wide-spreading or reflexed, $1\frac{1}{2}$ times the sepals. *Stamens* slightly exceeding the petals, spreading, filaments greenish, anthers yellow. *Scales* quadrate, orange, slightly notched. *Carpels* green, erect, slender, equalling or shorter than the stamens; in fruit erect, and $\frac{3}{8}$ inch long.

Flowers June, and often again later. Hardy.

HABITAT.—Widely spread in the Himalayas, 11,000–16,000 feet; central China; Yunnan.

This is the plant usually grown under the name of *S. asiaticum* DC. or sometimes *S. Wallichianum* Hooker; but as pointed out by MAXIMOWICZ (*Bull. Acad. Pétersb.*, 29, 126) De Candolle's plant

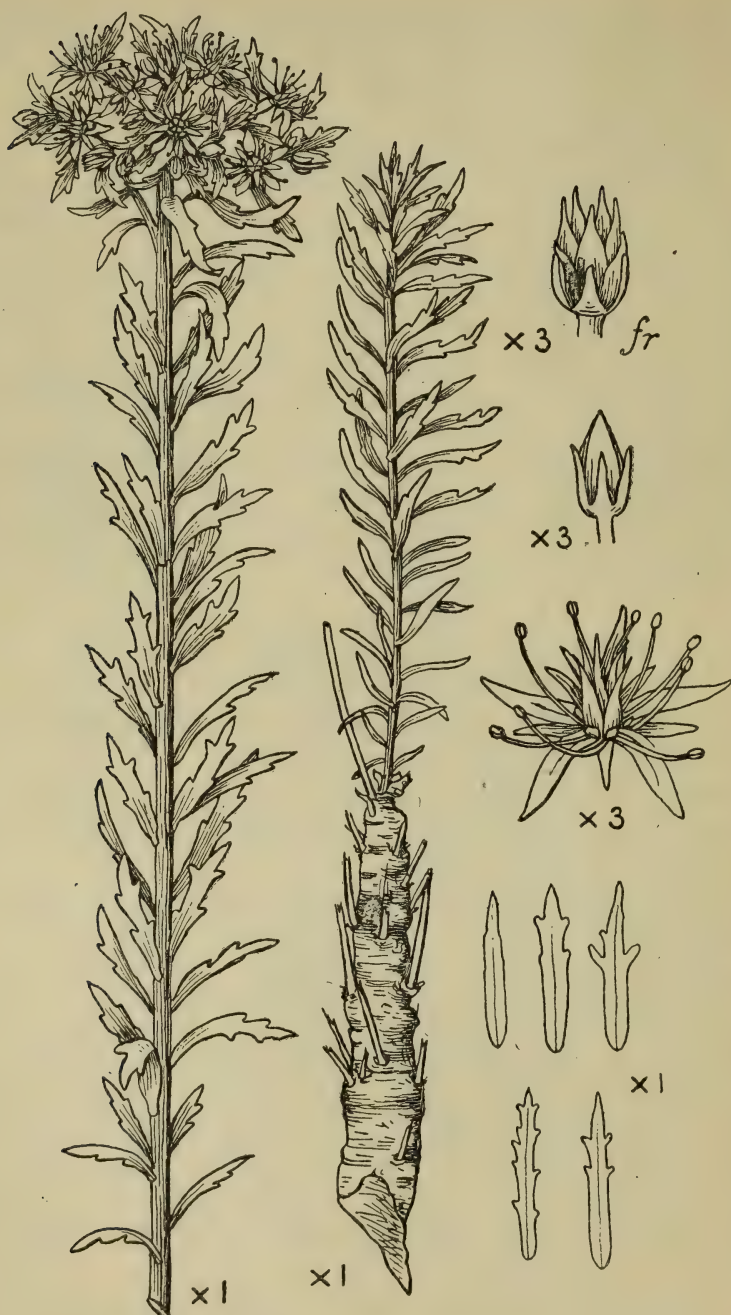


FIG. 20.—*S. crassipes* Wallich.

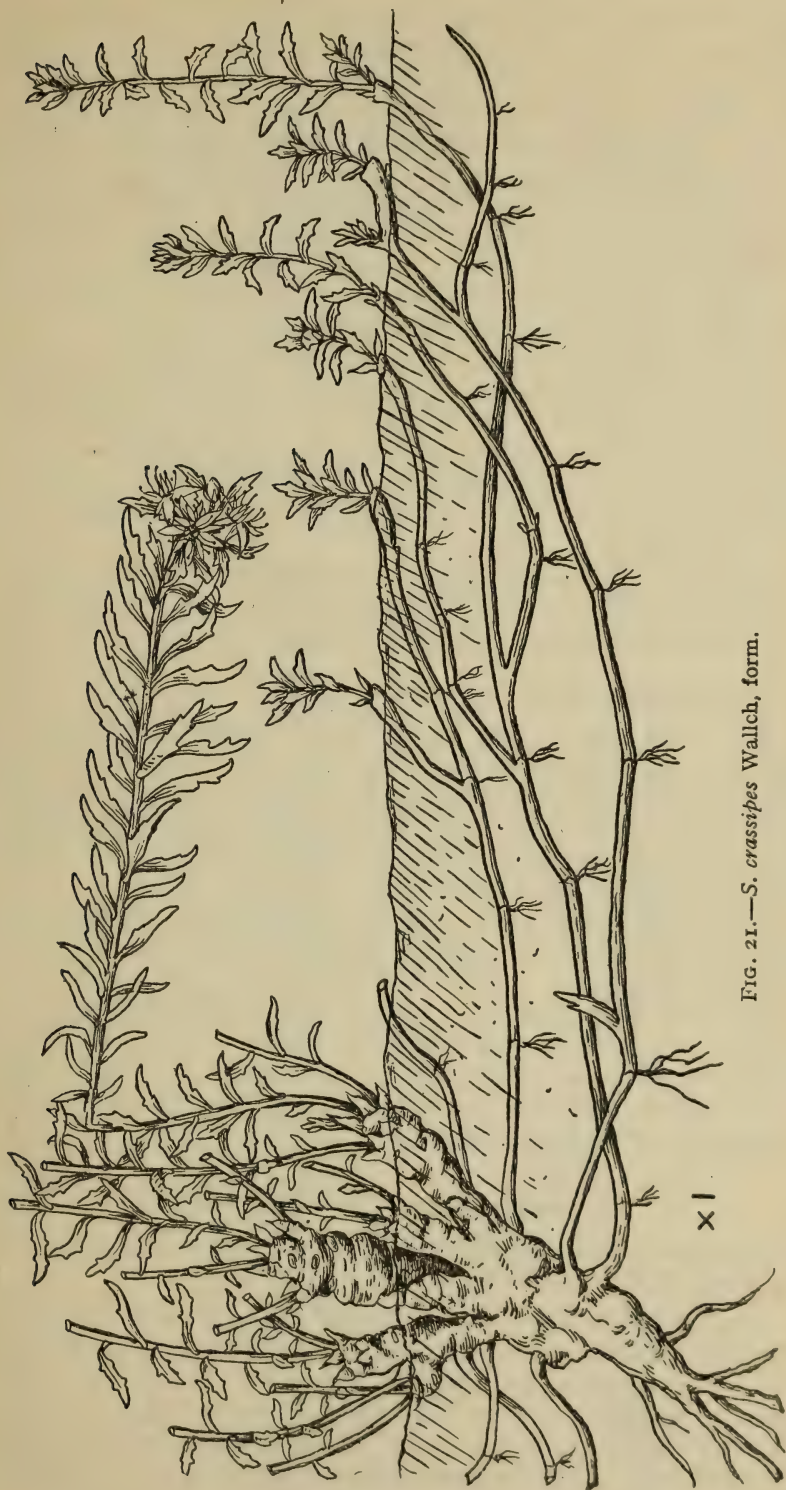


FIG. 21.—*S. crassipes* Wallich, form.

is described as having entire leaves ("foliis lineari-lingulatis integerrimis obtusis"), and is clearly different; Wallich's name *crassipes* appears to be the oldest for our plant. Hooker's *Wallichianum* is not distinct from it, being a form with leaves more divided than usual. The depth of the teeth varies, but I have not seen a living plant in which it is quite so marked as in HOOKER's plate. The flowers vary from small and whitish (the commoner form) to larger and greenish, the last named approaching the variety described below. The flowers are almost always bisexual, but I have a male plant received from Glasnevin; in it the carpels are very slender, little more than half as long as the stamens.

Under certain conditions the plant will send out suckers, an unusual feature in the *Rhodiola* group, and indeed in the genus. One strong young plant produced a ring of stems at a distance of 6 inches from the branched rootstock, arising from slender, branching, root-like underground stems emanating from the rootstock at 1 to 2 inches below the surface (fig. 21), in this respect connecting *S. crassipes* with *S. Cretini* Hamet.

Although the plant is variable, some of the forms tending towards the variety described below, the latter appears to merit varietal rank.

The species takes its name from its thick rhizome.

Var. **cholaense** Praeger in *Journ. of Bot.*, 57, 50, 1919 (fig. 22).

More robust than the type, plant of a more greyish green, inflorescence denser and more involucrate, the bracts being very long. *Leaves* 1-1½ inch long, ¼-⅜ inch broad, largest below the inflorescence. *Buds* ⅜ inch long, equalling the pedicels. *Sepals* very narrow, nearly linear, green. *Petals* nearly twice the sepals, erect, green, ⅜ inch long, linear-oblongate, blunt. *Stamens* equalling the petals, anthers greenish. *Scales* dark crimson. *Carpels* long, very erect, slender, exceeding the stamens, slightly diverging above, styles very short; erect and over ½ inch long in fruit.

A fine form, easily separated by its stouter growth, longer leaves, and large flowers wholly green, save for the conspicuous crimson scales.

Received from Lissadell nursery and seen also at Edinburgh, but the two had the same origin—the Chola Valley, East Sikkim, where the plant was collected by COOPER (No. 923). Received also, in the form both of roots and seeds, from Darjeeling Botanic Garden, presumably of the same origin.

15. *Sedum Stephani* Chamisso (fig. 23).

S. Stephani Chamisso in "Linnaea," 6, 549, 1831. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 127, 1883.

A plant intermediate between two well-known species—*S. crassipes* Wallich (*S. asiaticum* Clarke) and *S. roseum* Scopoli (*S. Rhodiola* DC.). It appears to be nearer to the former, of which it should perhaps be considered a variety; but as I have not had the opportunity of studying much material, I follow MAXIMOWICZ in giving it specific rank. The leaves come close to *S. crassipes*, but are broader;

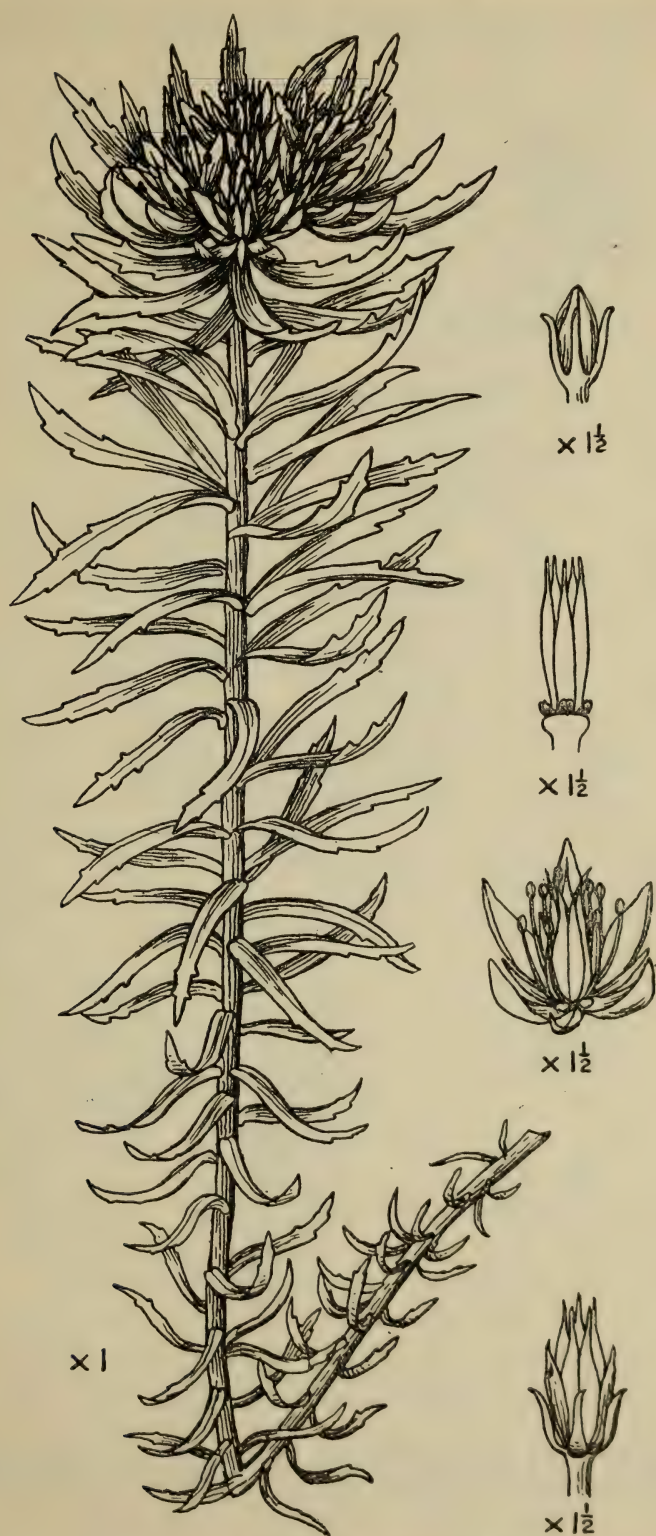


FIG. 22.—*S. crassipes* var. *cholaense* Praeger.

the plant has not the tall stems of that species, resembling in stature

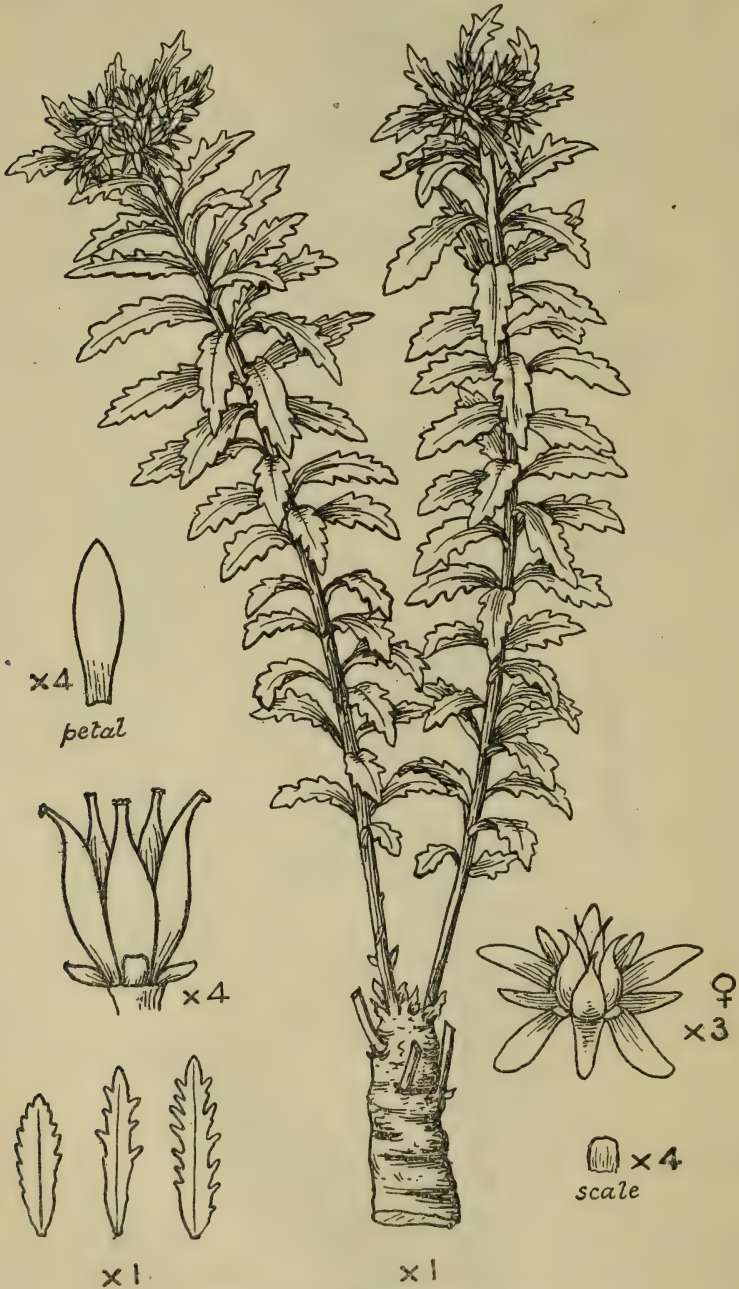


FIG. 23.—*S. Stephani* Chamisso.

the smaller forms of *S. roseum*, such as var. *Tachiroi*. Like *crassipes* and *Tachiroi* it is bright green, not glaucous.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thickened, but not excessively, resembling that of a slender *S. roseum*. *Stems* annual, erect, several from the axils of the not conspicuous scales which surround the growing point, 4–6 inches high, leafy throughout, smooth, round. *Leaves* alternate, loosely imbricate, sessile, linear-oblancoolate to linear-oblong, an inch long, $\frac{1}{2}$ – $\frac{1}{4}$ inch broad, irregularly and rather deeply toothed in upper half or throughout their length with teeth triangular to finger-shaped; on face bright green, flat, with depressed midrib; on back paler, rounded. *Inflorescence* dense, in my plants small and infrequent. *Buds* purple (back of sepals being coloured). *Flowers* $\frac{1}{2}$ inch long, $\frac{3}{8}$ inch across, on very short pedicels. FEMALE FLOWER:—*sepals* spreading, tapering, blunt, twice as long as broad, purple, longer than the green tube; *petals* patent, a little longer than the sepals, oblong-lanceolate, acute or obtuse, greenish-white; *stamens* absent; *scales* rounded, as long as broad, slightly retuse, orange; *carpels* green, oblong-lanceolate, equalling the petals, erect, with short diverging styles.

Flowers June. Hardy.

HABITAT.—Trans-Baikal region, eastern Siberia, Kamtschatka.

The plants which I have seen, and which are described above, were received from the Edinburgh Botanic Garden as *S. Stephani*, from F. SÜNDERMANN of Lindau as *S. rhodanthum* (a quite different N. American species, see p. 67), and from Glasnevin Botanic Garden as *S. asiaticum*. None of them is typical *Stephani*, which has 5-parted usually hermaphrodite flowers, and is intermediate between *S. roseum* var. *elongatum* and *S. crassipes*, inclining, according to MAXIMOWICZ, to the latter, though REGEL placed it as a variety of the former. It would seem, indeed, that MAXIMOWICZ would have placed it under *crassipes* but for its distinct geographical range, *S. crassipes* being confined to the Himalayas and Yunnan, and *Stephani* to N.E. Asia. The Edinburgh and Lindau plants referred to above have usually 4-parted unisexual flowers, but in other respects agree with *Stephani*. As both of these characters are notoriously inconstant among the Rhodiolas, these discrepancies are probably not important. The Glasnevin plant has flowers identical with the other two, but 5-parted, and the leaves are narrower, being indistinguishable from *crassipes*.

So far as these living plants throw light on the question, *S. Stephani* is certainly nearer to *crassipes* than it is to *roseum*. The slender carpels are very near those of *crassipes*; the petals also, which like the carpels are larger and broader than those of *roseum*. The plant flowers in June along with *crassipes* and after *roseum*. All my plants being female, I have not been able to compare the stamens or the mature fruit.

Named after FRIEDRICH STEPHAN, Moscow botanist.

16. *Sedum dumulosum* Franchet (fig. 24).

S. dumulosum Franchet, *Nouv. Arch. Mus. Hist. Nat.* (2) 6, 9.

SYNONYMS.—*S. rariflorum* N. E. Brown in *Kew Bulletin*, 1914, 208. *S. Farreri* W. W. Smith in *Notes Roy. Bot. Gard. Edinb.*, 9, 125, 1916.

ILLUSTRATION.—*Nouv. Arch. Mus. Hist. Nat.* (2), 5, pl. 16, fig. 3.

A pretty plant, which cannot be confused with any other species in cultivation: the thick aerial "Rhodiola" rootstock, linear leaves

and narrowly bell-shaped white flowers with elongate recurved tips sufficiently distinguish it.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, branched, aerial, set with the dry bases of the old stems. *Stems* several or many from



FIG. 24.—*S. dumulosum* Franchet.

the summit of the rootstock, annual, erect or arching, unbranched, 4-7 inches high, smooth, reddish, slender, very leafy. *Leaves* alternate, green, entire, glabrous, linear, rather acute, sessile, $\frac{1}{2}$ -1 inch long by $\frac{1}{16}$ - $\frac{1}{10}$ inch broad, fleshy, flattened on face with a median groove, rounded on back. *Inflorescence* very compact, terminal, of 6 to 12 flowers arranged on 1-2-flowered branches shorter than the flowers, each bearing 1 or 2 leaf-like bracts. *Flowers* white, $\frac{3}{8}$ inch long by $\frac{1}{2}$ inch across. *Buds* conical, acute. *Calyx* pale green, glabrous, segments

separate nearly to the base, slender, narrow, tapering, very acute, spreading. *Petals* white, erect, recurved above, oblong-lanceolate, acuminate, margins eroded, more than twice the sepals. *Stamens* shorter than the petals, filaments white, anthers red-purple. *Scales* small, yellow, quadrate, slightly notched. *Carpels* white, erect, about $\frac{1}{4}$ as long as the stamens.

Flowers June. Hardy.

HABITAT.—N. China.

This species and *S. Tatarinowii*, neither previously in cultivation, were sent to Kew in 1913 by Mr. F. N. MEYER of the American Legation at Pekin, who collected them at 3,000 mètres at Hsiao Wutai Shan.

A variable species, but especially characterized by its white bell-shaped flowers with petals prolonged into a slender tail and margins usually fringed. *S. rariflorum* of N. E. BROWN, in cultivation at Kew, is fairly typical *dumulosum*. *S. Farreri* W. W. SMITH, raised by the late Mr. FARRER from seed collected by him in Kansu, is a robust form with long sepals and broad petals much eroded.

17. *Sedum trifidum* Wallich (figs. 25, 26).

S. trifidum, Wallich Catalogue, No. 7230, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 100. Clarke in Hooker, "Flor. Brit. India," 2, 420. Masters in *Gard. Chron.*, 1878, ii. 267.

ILLUSTRATION.—*Garden*, 1885, 317.

A pretty plant with the thickened rootstock of the *Rhodiolas*, but distinct from other species of that section in its broad, deeply-incised leaves grouped near the top of the stems, and its lax inflorescence of large red flowers; and whereas most of the *Rhodiola* section are early flowerers, *S. trifidum* does not bloom till September.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, branched, sometimes elongate, but (in cultivation at least) not aerial. *Stems* several together, erect, unbranched, 6-8 inches high, slender, smooth, round, red, bare save near the top, or with a few small, entire, club-shaped leaves. *Leaves* alternate, crowded on the terminal 1 to 2 inches of stem, smooth, green, sessile, $1\frac{1}{2}$ -3 inches long, narrow and linear or tapered in the lower half, expanded above into an obovate lamina deeply and irregularly cut and toothed. *Inflorescence* a very leafy, lax, flat cyme about 2 inches across, of several minutely papillose forked branches, upper bracts linear, entire. *Buds* linear-lanceolate, blunt. *Flowers* $\frac{1}{2}$ inch across, mostly sessile, the lower shortly stalked. *Sepals* green, very fleshy, blunt, variable in length, $\frac{1}{4}$ to $\frac{1}{2}$ the petals, linear or lanceolate to short triangular (fig. 25, a, b). *Petals* purple-red, linear-lanceolate, apiculate, wide-spreading, ultimately reflexed. *Stamens* purple-red, spreading, slightly shorter than the petals. *Scales* red, cuneate, deeply notched, broader than long. *Carpels* white tinged red, nearly erect, equalling the stamens.

Flowers August-September. Hardy.

HABITAT.—Himalayas, widely distributed, 6,000-12,000 feet, on rocks and trees; Yunnan.

A distinct and pleasing plant, and one of the few *Sedums* that offers some difficulty as regards its cultivation. The best plants which I have seen were grown in deep, well-drained crevices not fully exposed to the sun. In the Himalayas on mossy tree-trunks or rocks it often grows a foot high, with large deeply pinnatifid leaves.

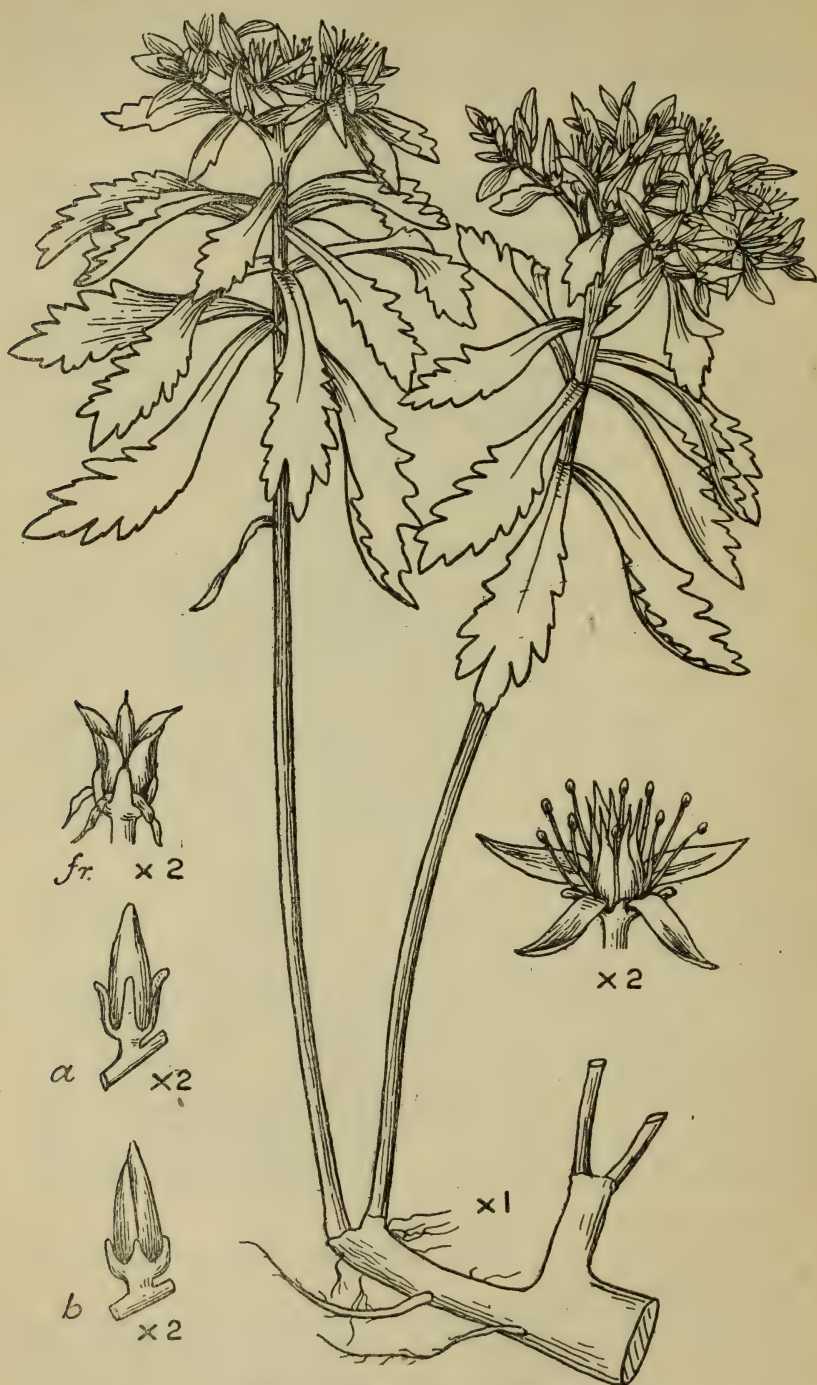


FIG. 25.—*S. trifidum* Wallich.

The leaves indeed vary greatly, as shown by fig. 26. The flowers are usually purplish red, but two consignments of collected plants received from Darjeeling had white flowers. The sepals are especially variable; in some cases they are even as long as the petals; at the other end of the series they are only one-fifth as long (fig. 25, *b*).

When MASTERS wrote his paper in 1878 he had seen only a single



FIG. 26.—Leaves of *S. trifidum*. $\times 1$.

plant of this species—in the frames at Kew—and it is still rather rare in cultivation.

Closely allied forms not uncommon in Yunnan (and of which I have distributed plants raised from seed sent by Rev. E. E. MAIRE) are referred by HAMET* to varieties of *S. linearifolium* Royle. While they appear to me to be better placed under *trifidum*, I await further information.

18. *Sedum Semenovii* Masters (fig. 27).

S. Semenovii Masters, in *Gard. Chron.*, 1878 ii., 267.

SYNONYM.—*Umbilicus Semenovii* Regel and Herder in *Bull. Soc. Nat. Moscou*, 39, ii. 65, 1866.

A racemose inflorescence is very rare in the genus *Sedum*, and the bottle-brush-shaped mass of whitish flowers borne by the present species gives it an unusual and distinct appearance. It most resembles the American *S. rhodanthum* (which name I found attached to it in one of the leading Botanic Gardens), but the latter has broader, usually toothed leaves and rose-coloured flowers.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, branched, deeply scarred at bases of old stems. *Stems* annual, erect, unbranched, 1–2 feet high, round, smooth, leafy throughout, several from the summit of the

* *Notes R. Bot. Gard. Edinb.*, 5, 119; 7, 399; 8, 142.



FIG. 27.—*S. Semenovii* Masters.

rootstock; barren stems none. *Leaves* crowded, 1-2 inches long, green, linear, entire, flat, and channelled above, rounded below, sessile, blunt, $\frac{1}{10}$ inch or more broad. *Inflorescence* dense, racemose, 1-3 inches long by about $\frac{3}{8}$ inch across. *Buds* ovate-oblong, blunt. *Flowers* greenish-white, $\frac{3}{8}$ inch long, lower shortly pedicelled, upper sessile. *Sepals* greenish, linear, acute, widening at the base, much exceeding the tube. *Petals* greenish-white, lanceolate, blunt, keeled, spreading but not widely, $1\frac{1}{2}$ times the sepals. *Stamens* erect, equalling the petals, filaments white, anthers reddish. *Scales* small, quadrate. *Carpels* erect, slender, greenish-white, at first equalling the petals; large and often flushed red in fruit.

Flowers June-July. Hardy.

HABITAT.—Turkestan.

Rather rare in cultivation. I have it from Berlin, Kew, Edinburgh, and from several private collections; and Mr. G. REUTHE offers the true plant. Its name commemorates P. SEMENOW, Central Asian traveller.

19. *Sedum rhodanthum* A. Gray (fig. 28).

S. rhodanthum A. Gray in *Amer. Journ. Science*, Ser. 2, **33**, 405, 1862. S. Watson, "Bot. of Nevada, Utah and Colorado," 101, 1871. Masters in *Gard. Chron.*, 1878, ii. 267.

SYNONYM.—*Clementsia rhodantha* Rose in *Bulletin New York Bot. Gar.*, **3**, 3, 1903. "N. Amer. Flora," **22**, 29.

A species remarkable on account of its abnormal inflorescence, which forms a dense raceme, very unusual in the genus. The only *Sedum* which resembles it is *S. Semenovii* from Turkestan, in which, however, the flowers are greenish-white and the leaves linear and entire, while in *rhodanthum* the flowers are normally rose-coloured, and the leaves are narrowly oblanceolate, and usually toothed near the apex. Other differences will be seen from a comparison of figs. 27 and 28.

DESCRIPTION.—An erect glabrous herbaceous perennial. *Rootstock* thick, somewhat branched, resembling that of *S. roseum*, except that the withered straw-like bases of the old stems are persistent. *Stems* usually several from the summit of the rootstock, erect, smooth, round, unbranched, very leafy, about a foot high. *Leaves* alternate, sessile, linear-oblanceolate, acute, flat, rather fleshy, green, ascending, entire or obscurely toothed near the apex, 1 inch long by $\frac{1}{4}$ inch wide, smaller below, bearing a median furrow on the face. *Inflorescence* a dense raceme 1-3 inches long by about an inch across. *Buds* lanceolate with spreading sepals. *Flowers* short-stalked, $\frac{1}{2}$ inch long. *Sepals* green or flushed red, erect, long, tapering, acute. *Petals* erect, slightly exceeding the sepals, lanceolate, acute, longitudinally folded, rose-coloured. *Stamens* erect, equalling the sepals, the epipetalous ones inserted half-way up, filaments green, anthers red. *Scales* short, yellow, roundish, spreading. *Carpels* pink, erect, equalling the stamens, erect in fruit; styles short.

Flowers June. Hardy.

HABITAT.—Meadows and streamsides in Rocky Mountains, Arizona to Montana.

Rare in cultivation. In gardens I have seen it only at Kew, and from the nursery of Messrs. WARE at Feltham; and a good gathering of the plant came to me from Boulder, Colorado, under the name *Rhodiola integrifolia*. The name *rhodanthum* is descriptive of its red flowers (which, according to American botanists, vary into white).



*



x 3



x 1

FIG. 28.
S. rhodanthum A. Gray.

Series III. PRIMULOIDES.

Group I. LONGICAULES.

20. *Sedum primuloides* Franchet (fig. 29).

S. primuloides Franchet in *Journ. de Bot.*, 1896, 287. Praeger in *Trans. Bot. Soc. Edinb.*, 27, 107.

ILLUSTRATION.—Praeger, *loc. cit.*, Plate 3.

A very distinct species, forming a little nearly deciduous bush a few inches high with many branches, each with a close, flat, rosette of leaves, and white egg-shaped flowers which are produced rather sparingly on short leafy branches. It cannot be confounded with any other species in cultivation.

DESCRIPTION.—A small sub-deciduous glabrous sub-shrub. *Stems* spreading, much branched, forming a little bush a few inches high, branches short, stout, shaggy below with withered leaves. *Leaves* green, fleshy, flat, entire, paler below, forming dense flattish rosettes at the ends of the branches, $\frac{3}{8}$ inch long, $\frac{1}{4}$ inch or less broad, stalked, obovate, rather acute, petiole flat, often equalling or exceeding the lamina, widened to a broad clasping base, which is stained with red. *Flower-shoots* arising from the axils of the withered leaves of the previous season, ascending, about 2 inches long, slender, with scattered leaves resembling those of the rosettes, but distant and not clasping. *Inflorescence* terminal, of 1 to 3 flowers. *Flowers* sessile or sub-sessile, ovoid, $\frac{3}{8}$ inch long. *Calyx* cup-shaped, sepals divided nearly to the base, green, fleshy, rather acute, margins membranous. *Petals* white, tinged green on back, erect, incurved so that the tips are contiguous, ovate, apiculate, edges fimbriate in upper part. *Stamens* nearly equalling the petals, erect, the epipetalous ones inserted $\frac{1}{4}$ way up. *Scales* yellow, truncate, broader than long. *Carpels* large, green, erect, nearly equalling the petals, styles short.

Flowers August. Hardy.

HABITAT.—Yunnan.

A very curious *Sedum*, which when described stood far apart from any other species; but the China-Tibet region has since yielded several others more or less akin to it, most of them still known only from the original dried specimens. The present species was re-collected by Mr. GEORGE FORREST, and distributed by Messrs. Bees, Ltd., in 1912. I have endeavoured to show that it and *S. Praegerianum* are primitive forms of *Rhodiola*, in which the scales which crown the rootstock retain their original leaf-form. In its alpine habitats the plant is usually very dwarf (fig. 29, *a*), but in cultivation its stems lengthen and branch (*b*).

Group 2. BREVICAULES.

21. *Sedum Praegerianum* W. W. Smith (figs. 30, 31).

S. Praegerianum W. W. Smith in *Notes R. Bot. Gard. Edinburgh*, 8, 348, 1915. Praeger in *Trans. Bot. Soc. Edinb.*, 27, 107.

ILLUSTRATION.—Praeger, *tom. cit.*, Pl. II.

A remarkable plant, unlike any other species in cultivation. The flat rosette of stalked lanceolate leaves, and prostrate flower-



FIG. 29.—*S. primuloides* Franchet.



FIG. 30.—*S. Praegerianum* W. W. Smith.

stems radiating like the arms of a star-fish and bearing rosy ovate flowers are quite peculiar.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, very short, erect, branching downward into thick woody roots a few inches long. *Root-leaves* forming a flat rosette about 4 inches across, entire, green, fleshy, flat, petiolate, the petiole rather longer or shorter than the lanceolate lamina, with a broad clasping base. *Flower-stems* arising from the axils of the withered root-leaves of the previous season, and appearing before the rosette of new leaves, slender, smooth, red, leafy, decumbent, unbranched, 4–6 inches long. *Stem-leaves* green, tipped red, flat, fleshy, glabrous, entire, sessile, linear-oblong,



FIG. 31.—*S. Praegerianum*, viewed from above. $\times \frac{1}{4}$.

rather blunt, $\frac{3}{8}$ inch long, reflexed. *Inflorescence* a terminal, leafy, lax cyme, bearing 5 to 10 flowers in all, composed of 2 to 3 forked or simple branches, with a flower in the primary or secondary forks, bracts leaf-like. *Buds* ovate, acute. *Flowers* ovoid, resembling those of heather, $\frac{5}{16}$ inch long, the lower ones shortly stalked. *Sepals* erect, ovate-lanceolate, acute, divided nearly to the base, green flushed red. *Petals* erect, curved so as to almost meet at the apices, lanceolate, shortly apiculate, rose-coloured, twice the sepals. *Stamens* equalling the petals, erect, filaments pink, anthers purple, the epipetalous ones inserted $\frac{1}{2}$ way up. *Scales* subquadrate, purple-brown. *Carpels* slightly shorter than the stamens, pink, very erect; styles very short, slender, erect, deep rose.

Flowers July. Hardy.

HABITAT.—Tibet.

A single plant was raised at Edinburgh in 1913 from a pinch of seed taken from a dried specimen just received into the Herbarium. The specimen in question was obtained by a native collector at Tarkarpo in the Chumbi Valley, Tibet, at 12,000 feet elevation.

The stemless rosette of leaves and radiating decumbent flower-stems give the plant an appearance very different from that of any other *Sedum* in cultivation. Its nearest relations are Tibetan and Central Asiatic species not in cultivation. Among garden plants the species which is nearest to it is *S. primuloides*, which agrees in possessing terminal rosettes of stalked, entire flat leaves, from the axils of which arise leafy flowering shoots bearing ovate flowers; but in *primuloides* the caudex is (in cultivation) elongated and much branched, the leaves very short and broad, and the flowers white.

SECTION II.—PSEUDORHODIOLA.

Section PSEUDORHODIOLA Diels in *Engler's Bot. Jahrb.*, **29**, 360, 1901.

Perennial. Flowers dioecious, 4-parted, and otherwise as frequent in Rhodiola. Habit, vegetative parts and carpels as in the following section, Telephium. Hardy Chinese plants.

Founded recently by DIELS for the reception of a few interesting plants intermediate between the preceding and succeeding sections. Four species have been described—*yunnanense*, *Henryi*, *valerianoides*, and *sinicum*; R. HAMET reduces the second and third to varieties of the first, and adds a third variety, *Forresti*. The only form in cultivation is *yunnanense* Franchet var. *valerianoides* Hamet.

22. *Sedum yunnanense* Franch. var. *valerianoides*
Hamet (figs. 32–34).

S. yunnanense Franchet, *Journ. de Bot.*, 1896, 286, var. *valerianoides* Hamet in *Notes Roy. Bot. Gard. Edinb.*, **5**, 117.

SYNONYM.—*S. valerianoides* Diels, in *Engler's Bot. Jahrb.*, **29**, 360, 1900.

S. yunnanense is a polymorphic species, with several varieties differing considerably in shape of leaf and inflorescence, &c. Var. *valerianoides* appears to be the only one in cultivation. It displays excellently the combination of the characters of the sections Telephium and Rhodiola, which form the feature of section Pseudorhodiola. It has the tall stem with broad ternate leaves of some of the Eastern Telephium species, and the small dioecious 4-parted flowers of Rhodiola. Though interesting botanically, the plant has no horticultural value, the flowers being very small and green.

DESCRIPTION.—A tall, glabrous herbaceous perennial. *Rhizome* thick, knotted, apparently not aerial. *Stems* solitary or a few together, 1–3 feet high, erect, smooth, round, unbranched, green or red, comparatively slender. *Leaves* ternate (occasionally in whorls of 4, opposite or alternate), sessile, flat, green, not very fleshy, ovate, acute, more or less serrate, slightly clasping, about 1½ inch long by ¾ inch broad. *Inflorescence* thyrsoid, 2–6 inches long by 1–3 inches broad, branches mostly in threes, many times divided. MALE FLOWERS very numerous, very small, usually yellowish green, 4-parted; *buds* obovate, as broad as long; *sepals* lanceolate, blunt, separate nearly to the base; *petals* spathulate, boat-shaped, sharply deflexed, twice the sepals; *stamens* shorter than the petals, spreading, anthers buff or reddish; *scales* bright yellow; *carpels* green, very small. FEMALE FLOWER:—4-partite; *sepals* and *petals* similar, linear or subulate, green or purplish, blunt; *stamens* absent; *scales* bright yellow or red; *carpels* diverging, twice the sepals and petals, green or purplish, stigmas yellowish. HERMAPHRODITE FLOWER:—4-partite; *sepals* lanceolate, blunt, green, twice those of the male, divided nearly to the base; *petals* as in male, but twice as large and edged purple; *stamens* twice as large as in male, filaments dark purple, anthers reddish; *carpels* as in female, but ½ longer; parts often in fives, usually in fours.

Flowers July.

HABITAT.—Yunnan, evidently common.

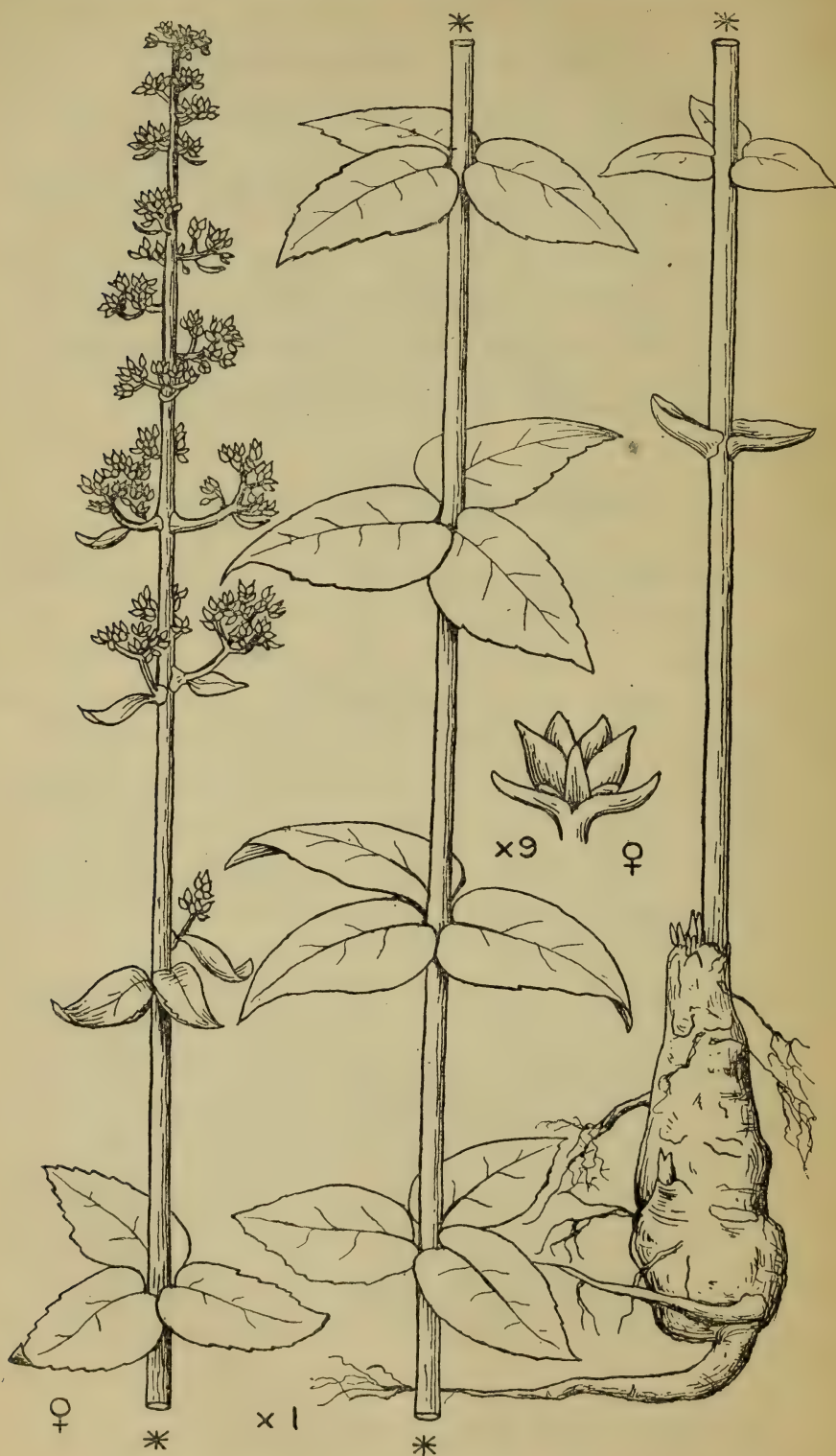


FIG. 32.—*S. yunnanense* Franch. var. *valerianoides* Hamet. Female plant.



FIG. 33.—*S. yunnanense* Franch. var. *valerianoides* Hamet. Male inflorescence.

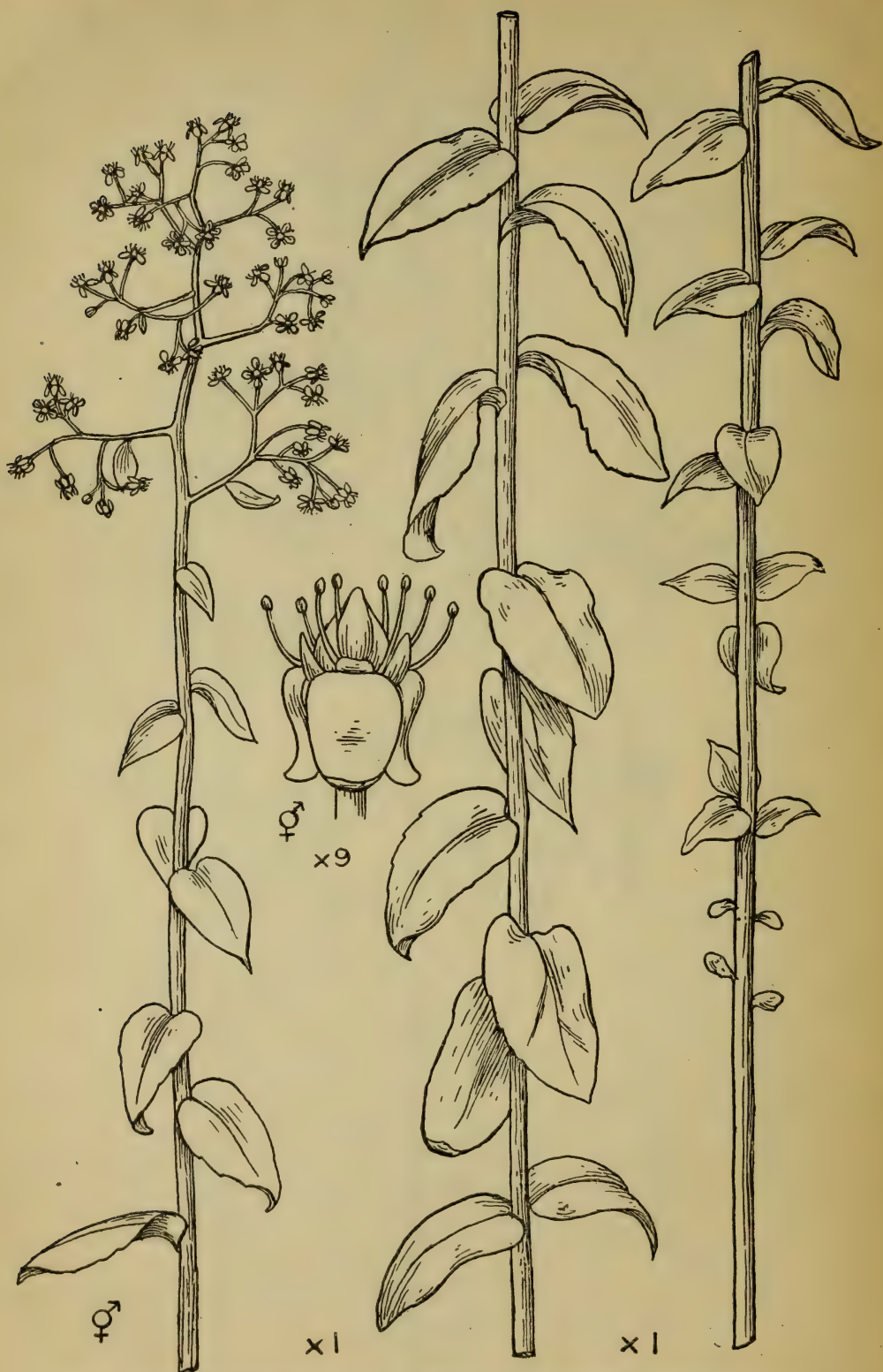


FIG. 34.—*S. rhodanense* Franch. var. *valerianoides* Hamet. Hermaphrodite plant.

Seen at Edinburgh, where, among a number of male and female plants, were three of an interesting and undescribed hermaphrodite form, with very large flowers (comparatively) and scattered reflexed leaves, of which I give a figure and description. It may deserve varietal rank, but in the absence of better knowledge of this variable species I hesitate to create a new name. Grown also from seeds received from Yunnan from Rev. E. E. MAIRE, both male and female plants.

As in the many *Rhodiolas*, the colour of the parts of the flower is variable (see also *Notes Roy. Bot. Gard., Edinb.*, 8, 139), and the leaves vary from green to reddish.

SECTION III.—TELEPHIUM.

Section TELEPHIUM S. F. Gray, "Nat. Arrang. Brit. Plants," 2, p. 539, 1821.

Perennial. Rootstock short, with roots (fig. 35) usually thick,



FIG. 35.—Roots of *S. Telephium*.

branched, often of carrot-like tubers, summit without scales. Stems mostly annual, produced from buds arising generally in autumn from points beside or above the base of the stems of the previous year. Leaves usually broad. Flowers hermaphrodite, 5-parted, white, red, purple, or green. Hardy plants, mostly Eurasian.

A group of about twenty-five perennials, often tall. The well-known Orpine, *S. Telephium*, is typical. They range across the temperate regions of the Old World from England to Japan, being

more abundant in the East. One species, *S. telephioides* (perhaps only a variety of *S. Telephium*), is confined to N. America. At least half of the group is in cultivation, including representatives of all the types found within the section; many of them are familiar garden plants.

Series I. ERECTICAULES.

Stems tall (1-2 feet), stout, erect, leaves large (2-4 inches long).

Group 1. EU-TELEPHIA.

Leaves alternate or opposite, rarely ternate.

maximum Suter.

alboroseum Baker.

Telephium Linn.

pseudospectabile Praeger.

Taquetii Praeger.

spectabile Boreau.

The first two of these are familiar European plants; the rest come from the Far East, where several additional species not in cultivation also occur.

Group 2. VERTICILLATA.

Leaves 4- or 5-verticillate.

verticillatum Linn.

This is a small Chino-Japanese group, only one of which is in cultivation.

Series II. HUMILICAULES.

Stems short (about $\frac{1}{2}$ foot), weak, nor erect, leaves smaller (1 inch long or less).

Group 1. ARCUATAE.

Stems annual, arching or at least erect at the base.

Ewersii Ledebour.

Sieboldii Sweet.

cauticolum Praeger.

Tatarinowii Maximowicz.

Group 2. REPENTES.

Stems perennial, creeping.

Anacampteros Linn.

cyaneum Rudolph.

I have adopted a grouping founded on the larger features of the plants, because the flowers in the *Telephium* group have a somewhat close resemblance, and moreover a classification founded upon them brings together plants of very different growth-form and separates others, which in all but flower have clear affinities.

Fig. 36 shows the gynœcia and leaves of the *Eu-Telephium* series in the order of relationship indicated by the flowers; it will be evident

that the leaf affinities are quite different from the flower affinities. The only two nearly related species in the whole section which display

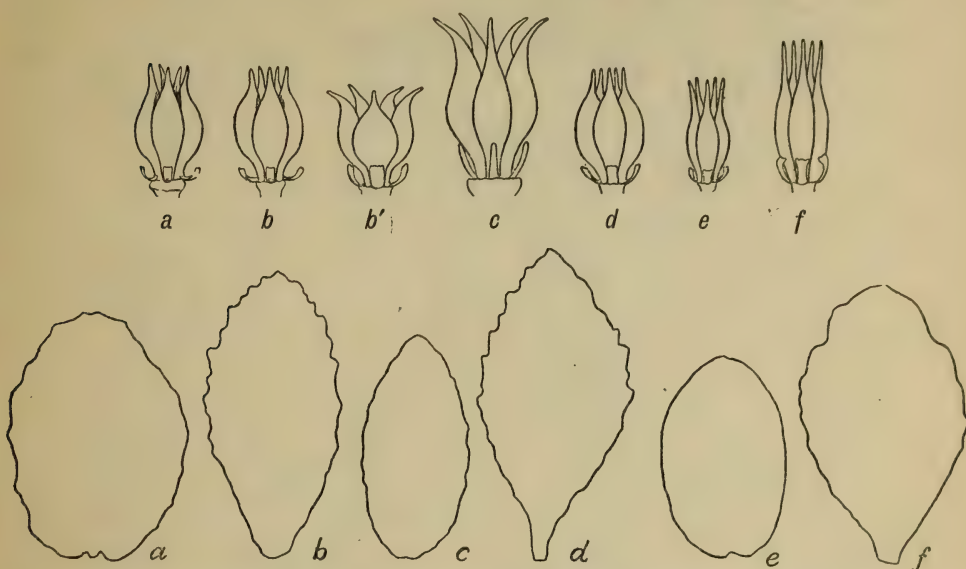


FIG. 36.—Gynœcium and leaf of species of *Telephium* section. *a*, *maximum*; *b*, *purpureum*; *b'*, *purpureum* ♀; *c*, *Taquetii*; *d*, *alboroseum*; *e*, *pseudospectabile*; *f*, *spectabile*. Gynœcia $\times 3$. Leaves $\times \frac{1}{2}$.

their affinity throughout the various parts of the plant are *S. Sieboldii* and *S. caucicum*.

Series I. ERECTICAULES.

Group I. EU-TELEPHIA.

23. *Sedum maximum* Suter (figs. 36, 37).

S. maximum Suter, "Flora Helvetica," 1, 270, 1802. Masters in *Gard. Chron.*, 1878, ii. 336.

SYNONYM.—*S. macrophyllum* of some gardens (a name also applied to *S. alboroseum*).

ILLUSTRATIONS.—Reichenbach, "Fl. German." 23, tab. 45. Plenck, "Icones Plant. Medicinalium," tab. 350. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 4. Zenker, "Fl. Thuringen," 5, tab. 570 (as *S. Telephium*), 12, tab. 1353.

A variable species, but without question many of its so-called varieties are due to crossing with *S. Telephium*. The plant, when typical, is known at once from *S. Telephium*, to which it is closely allied, by its greenish flowers and very broad, slightly toothed dark-green opposite leaves. Variation in the large series of garden forms which I have examined is mostly in the direction of *S. Telephium*. In my garden I grew for some years the *purpureum* form of *S. Telephium*, which seeded freely and kept constant. Later I introduced typical *S. maximum*, collected by the Baltic, near Danzig, where it also showed

FIG. 37.—*S. maximum* Suter.

no variation. Since then I have had self-sown seedlings showing every combination of the characters of the two species as regards colour of flower, size, shape and arrangement of leaf. Many of these match described varieties fairly well, so that, for horticultural purposes, it seems futile to devote space to many of the latter. Descriptions of a large number of these segregates will be found in Boreau's paper, "Monographie de quelques Sédum" in "Mémoires de la Société Académique d'Angers," 20, 1866. A good account of the forms found in France, to the number of 19, is given in Rouy and Camus, "Flore de France," 7, p. 96. Very fine coloured illustrations of many of the forms of this and other of the equally variable *S. Telephium* are published in Jordan and Fourreau, "Icones ad Floram Europæ," 1, 1866-68, as species of a segregate genus *Anacampteros*.

I have had in cultivation a large series of *maximum* forms and hybrids, received under many names from many sources, and have not succeeded in satisfying myself how far variation in character, such as alternate instead of opposite leaves, or reddish pigment in the flower is inherent in *S. maximum* or due to *Telephium* influence. As regards variation in undoubtedly pure *maximum*, its most striking manifestation is in the development of brownish-purple pigment in the leaves and stems, and the substitution of ternate for opposite leaves. These find their most marked expression in the noble var. *atropurpureum*, referred to below.

DESCRIPTION.—A large glabrous herbaceous perennial. *Rootstock* thickened. *Roots* a bunch of carrot-like tubers. *Stems* 1-3 feet, erect, smooth, round, green or red, unbranched, or branched near summit, annual. *Leaves* usually dark green, sessile, clasping, usually opposite, often ternate, sometimes alternate (different stems of the same plant often showing all three of these variations), broadly ovate, blunt, slightly and irregularly toothed, 2-3 inches long by half to two-thirds as broad. *Inflorescence* composed of terminal and also lateral dense corymbs; stems of lower corymbs long; ultimate pedicels slender, longer than the flowers. *Flowers* 5-parted, crowded, greenish-white, $\frac{3}{4}$ inch across. *Buds* ovoid, ribbed, blunt. *Sepals* green, fleshy, lanceolate to deltoid, acute, $\frac{1}{2}$ to $\frac{1}{3}$ as long as the petals, tube short. *Petals* ovate-lanceolate, rather acute, greenish-white. *Stamens* slightly exceeding the petals, filaments white, anthers yellow. *Scales* yellow, linear, notched, twice as long as broad. *Carpels* stout, erect, greenish, non-contiguous on inner face, equalling the petals.

Flowers August-September. Hardy.

HABITAT.—Widespread in Europe; Caucasus.

var. *atropurpureum* hort.

Leaves and stems deep purple. This definition covers a number of forms, varying in size, habit, and pigmentation. The most striking of them is an extremely vigorous plant, three feet or more in height, leaves usually ternate and up to 5 inches long by 3 inches broad, stem and leaves dark purple, flowers pink. It is not uncommon in gardens. A smaller form is figured by Masters ("Hardy Sedums," l.c.).

f. *versicolor* Van Houtte.

(*S. Rodigasi* of gardens.) A handsome variegated form, with silver-splashed leaves and pink stems, well illustrated in "Flore

des Serres," tab. 1669. Stated to be rather tender, I have not met with it in cultivation, but it is no doubt still grown.

This species is frequent in gardens, though often of doubtfully pure parentage. The name refers to its size; in some of its forms it is the largest of European Sedums.

24. *Sedum Telephium* Linn.

S. Telephium Linn. Species Plantarum 430, 1753. Masters in Gard. Chron., 1878, ii. 303.

This common species, which ranges right round the northern Hemisphere—for the American *S. telephioides* does not appear to be specifically distinct—is easily known by its stout, erect, leafy stems, and dense corymbs of red-purple flowers. Its nearest allies are *S. maximum* and *S. alboroseum*, but the former has (when typical) opposite leaves and green flowers, and the latter greenish-white petals and rosy carpels. *S. spectabile* differs in its pink flowers with very long stamens. All have the characteristic *Telephium* rootstock—a bunch of carrot-shaped tubers.

LINNAEUS' name is derived from TELEPHUS, son of HERCULES.

Sub-species *S. purpureum* Link (figs. 36b, 38).

S. purpureum Link, "Enum. Plant. Berol.," 1, 437, 1821.

ILLUSTRATIONS.—Sowerby, "Engl. Bot.," ed. 3, pl. 526. Reichenbach, "Flor. German.," 23, tab. 44. Curtis, "Flor. Londin.," 2, pl. 71. De Candolle, "Plantes Grasses," tab. 92. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 6.

DESCRIPTION.—A stout glabrous herbaceous perennial. Rootstock thick, with carrot-like tubers. Stems clustered, stout, erect, round, smooth, leafy, 1-1½ foot high, mostly with axillary branches above. Leaves numerous, alternate, glabrous, fleshy, ascending, about 3 inches long by 1½ inch broad, smaller above, blunt, irregularly toothed in upper two-thirds, lower ones obovate-oblong wedge-shaped below, upper ones oval-oblong rounded below, all sessile. Inflorescence of dense terminal and lateral subglobose stalked corymbs. Flowers purplish red, $\frac{5}{16}$ to $\frac{7}{16}$ inch across, about as long as the pedicels. Buds streaked purple, with green ribs. Sepals green, fleshy, lanceolate, acute, separate nearly to the base. Petals wide-spreading, lanceolate, acute, thrice the sepals. Stamens spreading, nearly equalling the petals. Scales yellow, strap-shaped, twice as long as broad, emarginate. Carpels erect, purple, shorter than the stamens, furrowed on the back; styles very short.

Flowers August–September. Hardy.

HABITAT.—From England to Japan.

Sub-species *S. Fabaria* Koch (fig. 39).

S. Fabaria Koch, "Synopsis Flor. German.," ed. 1. 258, 1837.

ILLUSTRATIONS.—Sowerby, "Engl. Bot.," ed. 3, pl. 527. Reichenbach, "Flor. German.," 23, tab. 47. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 7.

DESCRIPTION.—Very like *S. purpureum*, but is a smaller and slenderer plant; leaves deeper green, narrower, and thinner, all wedge-shaped below (instead of



FIG. 38.—*S. purpureum* Link.



FIG. 39.—*S. Fabaria* Koch.

upper ones rounded below), shortly and indistinctly stalked (instead of sessile); ovaries not furrowed on back.

Flowers August–September. Hardy.

HABITAT.—Britain to Central Europe.

When characteristic, *S. purpureum* and *S. Fabaria* are easily distinguished, but there are many plants which one hesitates to refer to one form or to the other—whether this is due to crossing or not I cannot offer an opinion. The “wild” British plants which I have grown have all been *Fabaria*, but I do not attempt to go into the question of the distribution in the British Isles of the two forms. The confusion which seems fated to hang over the Sedums is here especially marked, as, for instance, when one receives from one of the ablest of English field botanists roots of the Japanese *S. alboroseum* as a native *Telephium* form from woods in Sussex!

As in the case of its near ally *S. maximum*, a large number of varieties of *S. Telephium* have been described, particularly by French botanists, and a good account of these will be found in Rouy and Camus, “Flore de France,” vol. vii. For reasons stated in the Introduction to the present paper (p. 15) and under *S. maximum* on p. 81, no attempt is made here to enter into a discussion of these. The reader seeking information regarding them should consult Boreau, “Monographie de quelques Sédum,” *Mém. Soc. Acad. d'Angers*, vol. xx. 1866; Masters in *Gard. Chron.*, 1878, ii.; Rouy and Camus, “Flore de France,” vol. vii. 1901; and the beautiful coloured plates in Jordan and Fourreau, “Icones ad Floram Europae,” vol. i. 1866–8. It may be said that they belong almost altogether to *S. purpureum*, not to *S. Fabaria*. Among the garden forms variation is very noticeable in the height and colour of stem; in the arrangement, size, shape, dentition, and colour of leaves; and in the size, shape, and colour of inflorescence and flower. *S. Telephium* seems to vary much more in directions other than towards *maximum*, than *S. maximum* does, except towards *Telephium*. Nevertheless, the presence of many intermediates is discouraging in the search for satisfactory varieties. In the case of *Telephium*, confusion is very probably produced in gardens by the natural crossing of varieties, as the species tends to produce itself from seed more freely than the majority of Sedums.

Var. **Borderi** Rouy and Camus.

Of the forms of *S. Telephium* found in gardens which I have succeeded in identifying with described varieties, the one which appears most satisfactory, as maintaining a distinct and uniform facies, is *S. purpureum* var. γ *Borderi* Rouy and Camus, “Flore de France,” 7, 103–4 (*Anacamperos Borderi* Jordan and Fourreau, “Brev. Plant. Nov.,” fasc. i. 30, and “Icones Plant. Eur.,” t. 96), which has leaves deeply and irregularly toothed and distinctly stalked (fig. 38, a). This was received from several garden sources, mostly named var. *carpaticum* (*S. carpaticum* Reuss), which is somewhat similar.

f. *roseo-variegatum*.SYNONYM.—Var. *bittoniense* hort.

Variegated forms are so rare in *Sedum* that mention may be made of an interesting form which originated in the garden of the late Canon Ellacombe. In this the young stems and leaves are of a bright pink colour, but on approaching maturity they turn green. It is now in several gardens.

A curious unisexual (female) form of *purpureum* is at Glasnevin, derived from a garden source. In this (see fig. 36b') the sepals are normal; the petals small, only $1\frac{1}{2}$ times as long as the sepals, ovate-oblong, very concave, very blunt, whitish flecked with rose on back, almost erect; carpels $1\frac{1}{2}$ to 2 times the petals, not contiguous on the inner face, but having a central space in many cases as large as a carpel; very irregular as regards position, and varying in number from 3 to 6, deep rose-coloured above; styles very short, spreading widely (instead of erect or slightly spreading as in the type). Occasionally a single filament without an anther is present. The cause of the irregularity of position of the carpels and of the central hollow is their abnormal width: they are 2 mm. across (instead of $1\frac{1}{2}$ mm.) and are remarkably flat on both inner and outer faces.

25. *Sedum Taquetii* Praeger (figs. 36c, 40).

S. Taquetii Praeger in *Journ. of Bot.*, 56, 151, 1818.

Allied to *S. Telephium*, *S. maximum*, *S. pseudospectabile*, and *S. alboroseum*, from all of which it is separable by its larger green and purple flowers, and especially by its remarkably large carpels with divergent tips. It comes nearest to *maximum* and *alboroseum*, resembling the former (not the latter) in having its leaves opposite and sessile, and the latter in having red pigment in the carpels, but not in the petals. Its habit is that of *alboroseum*, but it lacks the pale-green colour of that species, the leaves being of a deep-green shade, as in *Telephium*, but of the shape of those of *pseudospectabile*.

DESCRIPTION.—A glabrous herbaceous perennial. Rootstock fleshy, with spindle-shaped tuberous roots as in *S. Telephium*. Stems annual, erect, 1–1½ foot high, moderately stout, smooth, round, thickened below the nodes, mostly with some ascending axillary branches in the upper third. Leaves opposite, equalling or longer than the internodes, sessile, elliptic, rounded at apex and base, slightly and bluntly toothed, fleshy, dark green more or less dotted with purple, about 2½ inches long by 1½ inch broad, edges upturned in lower half so that the leaf appears to clasp the stem. Inflorescence of terminal and lateral rather dense rounded corymbs, 1–2 inches across, the lateral ones falling short of the terminal. Buds elliptic, blunt, green, $\frac{1}{4}$ – $\frac{3}{8}$ inch long, on pedicels of the same length. Flowers up to $\frac{3}{8}$ inch across, $\frac{3}{8}$ inch long, rather irregular in size. Sepals dark green, lanceolate or deltoid, blunt, fleshy, twice as long as the tube. Petals four times the sepals, up to $\frac{3}{8}$ inch long, linear-oblancoate, rather blunt, pale green, whitish near the base, wide-spreading. Stamens equalling the petals, the epipetalous ones adnate in the lower third, filaments whitish, anthers ovate, pale red. Scales strap-shaped, straight, four times as long as broad, emarginate, whitish, yellow at the apex. Carpels long, slender, erect with spreading tips, tapered below, merging into short styles above, equalling or slightly exceeding the petals, green streaked with purple, purple on the upper part of the inner face.



FIG. 40—*S. Taquetii* Praeger.

Flowers August-September. Hardy.

HABITAT.—Korea.

For the opportunity of studying this plant I am indebted to the Director of the Botanic Gardens at Upsala, who kindly sent his only plant and allowed me to grow it for a couple of seasons. It was raised from seed collected by Abbé E. J. TAQUET in Korea and distributed by the Dendrologische Gesellschaft of Vienna.

The plant varies as regards the size of its flowers, which are, however, always larger than those of any of its allies; if grown in shade, the purple pigment is not developed, the flowers being then wholly green; but the long slender curved carpels will always identify it, fresh or dried.

Seedlings which I raised from this plant were evidently crosses with *S. Telephium*, as most of my *maximum* seedlings have been (see p. 8), and were intermediate in characters of both leaf and flower. A puzzling plant of unknown antecedents, received from Edinburgh as *S. alboroseum*, almost exactly matches these and appears to be of similar parentage, though where the *Taquetii* blood came from in that case is unknown.

Named after its collector.

26. *Sedum alboroseum* Baker (figs. 36d, 41).

S. alboroseum Baker in Saunders' "Refug. Bot.," tab. 33, 1868.
Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 140, 1883.

SYNONYMS.—*S. erythrostictum* Masters in *Gard. Chron.*, 1878, ii. 337 (not of Miquel in *Ann. Mus. Bot. Lugd.-Bat.*, 2, 155, which appears to be a form of *S. Telephium*—see Maximowicz, *loc. cit.*).

S. japonicum of gardens (not of Siebold, see p. 254).

S. macrophyllum of gardens (a name also applied to *S. maximum*).

ILLUSTRATIONS.—Baker, *loc. cit.* Regel, "Gartenflora," tab. 709, figs. 4-5.

Not infrequent in gardens, mostly under the names of *japonicum* or *macrophyllum*, and reported by BAKER as in cultivation for many years before he described it in 1868. Leaves usually opposite, though BAKER says they are never so. The plant most resembles a large pale *Fabaria*, but the whitish petals and rosy carpels distinguish it. In bud the uppermost leaves (bracts) half enclose the inflorescence in a characteristic way, while in the *Telephium* forms these are spreading; indeed, all the leaves are more erect than in *Telephium*. Taller and slenderer than the wholly pink-flowered *S. spectabile*, of which the leaves are broader, more crowded and more spreading and the inflorescence larger and flatter. A very late flowerer (latter half of September). The name *alboroseum* is taken from the white and red flowers.

DESCRIPTION.—A tall glaucous herbaceous perennial. *Rootstock* thickened, with carrot-like tuberous roots. *Stems* annual, 1-2 feet high, smooth, round, unbranched, erect. *Leaves* rather distant, usually opposite (sometimes alternate or ternate), ascending, lower concave, upper smaller and very flat, ovate to obovate-cuneate, narrowed into a short petiole, pale glaucous green, bluntly toothed, 2-3 inches long by half as broad. *Inflorescence* dense, sparingly leafy, of terminal and often lateral corymbs. *Buds* ovoid, rather blunt, remaining



FIG. 41.—*S. alboroseum* Baker.

pale green until they open. *Flowers* $\frac{1}{2}$ inch across, equalling the pedicels. *Sepals* pale green, lanceolate, fleshy, acute, $\frac{1}{4}$ the petals, tube very short. *Petals* $\frac{1}{2}$ inch long, oblong-lanceolate, acute, wide-spreading, greenish white. *Stamens* spreading, equalling the petals, filaments white, anthers reddish, the epipetalous ones inserted $\frac{1}{4}$ way up the petal. *Scales* linear, twice as long as broad, retuse, greenish. *Carpels* erect, pink, equalling the petals, giving a pinkish colour to the flower; styles short.

Flowers September. Hardy.

HABITAT.—Japan, Manchuria, China.

f. foliis medio-variegatis Regel, "Gartenflora," tab. 709, fig. 6.

A form with a white blotch in the centre of the leaf, occasionally seen in gardens. Like many variegated plants it is best grown in shade. Inclines to revert to type, and stems with green leaves need to be pulled off.

f. foliis margine-variegatis.

Leaves with a border of greenish-white. I received this from Ottawa and from the Tully Nursery in Co. Kildare, and there is a specimen of it in the Kew Herbarium from "Hort. Justus Corderry, Oct. 14, 1904"; I find no published reference to it. It is a form of no great merit.

27. *Sedum pseudospectabile* Praeger (figs. 36e, 42).

S. pseudospectabile Praeger in *Journ. of Bot.*, 54, 40, 1917.

Closely allied to the well-known *S. spectabile* Boreau, from which it differs in its stems half as tall again, leaves green (not glaucous), rounded at the base (not cuneate), and about as long as the internodes (not twice as long), smaller inflorescence, and flowers with all the parts shorter by about one-third; it flowers nearly a month earlier.

DESCRIPTION.—An erect glabrous herbaceous perennial. *Roots* tuberous, carrot-like. *Stems* annual, few, erect, unbranched, smooth, round, green dotted red, 1–2 foot high. *Leaves* ternate or opposite (occasionally in fours), fleshy, sessile, clasping, entire or obscurely toothed, green with paler veins, lower broadly obovate, upper broadly ovate, $1\frac{1}{2}$ to 2 inches long by 1 to $1\frac{1}{4}$ broad, equalling the internodes, mostly concave, often margined and dotted with red. *Inflorescence* a terminal compact flat paniced cyme, about 2 inches long and broad, sparingly leafy. *Buds* oval, bluntly pointed. *Flowers* $\frac{5}{16}$ inch long, $\frac{1}{4}$ inch across, on pedicels shorter than the flowers. *Calyx* cup-shaped, rather glaucous green, segments ovate-lanceolate, acute, thrice the tube, tipped red. *Petals* twice the sepals, $\frac{5}{16}$ inch long, pink, ovate-lanceolate, acute, spreading but not patently. *Stamens* $1\frac{1}{2}$ times the petals, nearly erect, the epipetalous ones inserted near the base of the petals, filaments pink, anthers purple. *Scales* yellowish, curved upwards, quadrate-cuneate, $1\frac{1}{2}$ times as long as broad. *Carpels* erect, slender, pink, equalling the petals, styles slightly divergent.

Flowers August–September. Hardy.

HABITAT.—Chinwangtao, on the coast east of Pekin (Prof. I. BAYLEY BALFOUR, 1910).

Received first from Edinburgh as above; when the plant flowered it proved to be identical with another received meanwhile from the University Botanic Garden at Sapporo under the name *S. spectabile*.

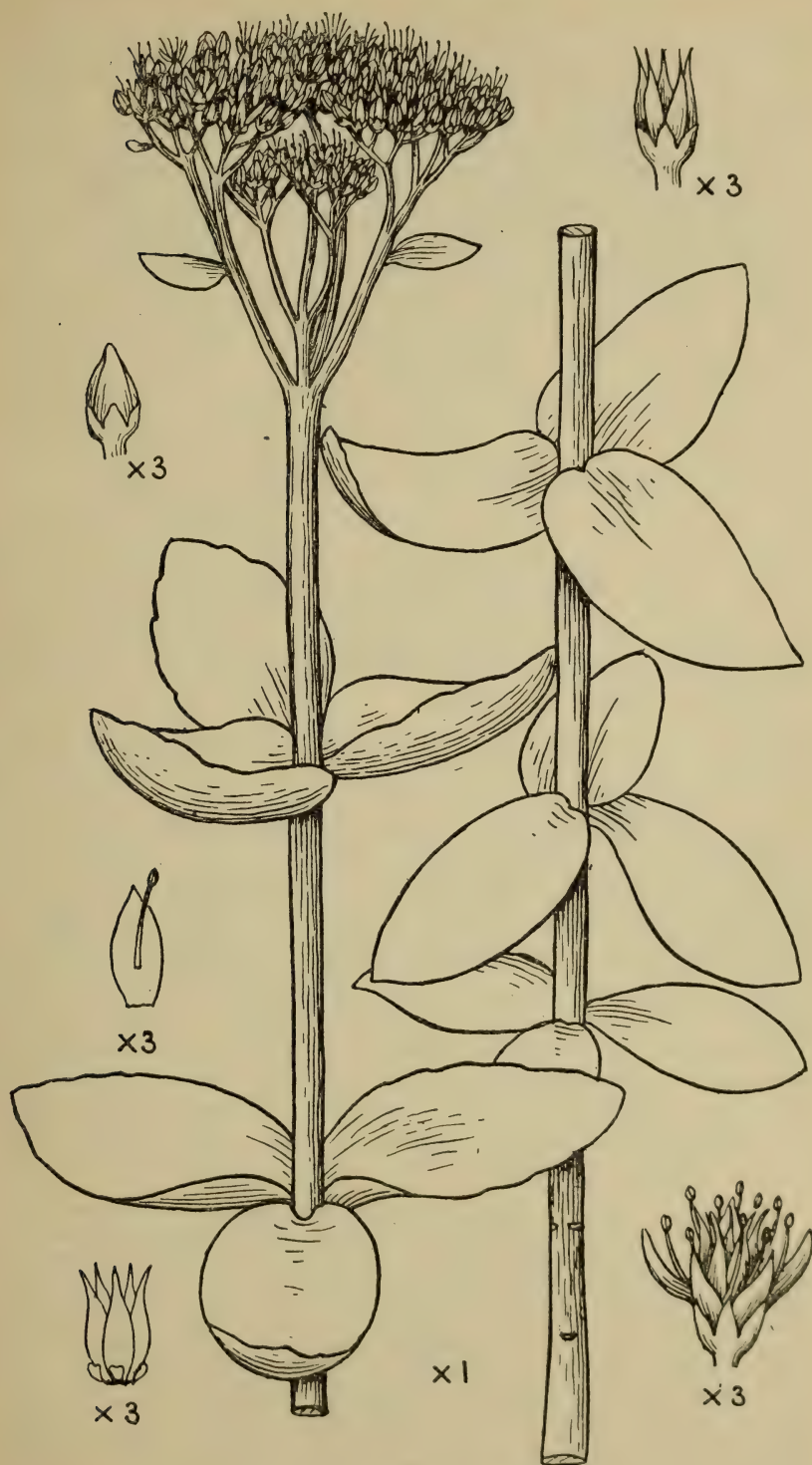


FIG. 42.—*S. pseudospectabile* Praeger.

In the early stages of growth this species recalls *S. maximum* rather than *S. spectabile*, on account of its green colour, comparatively narrow outline and sessile leaves, broad and rounded at the base; the shape and colour of the inflorescence recall *spectabile* strongly, and the flowers resemble those of *spectabile* with all the parts shortened. The different proportions of the plant give it an appearance different from *spectabile*: thus, the ratio of height to diameter of inflorescence is about 3 to 1 in *spectabile*, 6 to 1 in *pseudospectabile*; the ratio of height to width of the plant across the leaves is $2\frac{1}{2}$ to 1 in *spectabile*, 5 to 1 in the other. The length of the petals, stamens, and carpels is in *pseudospectabile* $\frac{2}{3}$ of that found in *spectabile*, while their breadth remains the same. In the *Telephium* group, the floral characters are often so similar in quite different species that the similarity of flower in the two species under consideration does not necessarily suggest merely varietal difference.

Named from its resemblance to *S. spectabile*.

28. *Sedum spectabile* Boreau (figs. 36f, 43).

S. spectabile Boreau in "Mém. Soc. Acad. Maine-et-Loire," 20, 116, 1866.

Maximowicz in *Bull. Acad. Pétersbourg*, 29, 140, 1883. Masters in *Gard. Chron.* 1878, ii. 336.

ILLUSTRATIONS.—Regel, "Gartenflora," tab. 709, figs. 1-3. Saunders, "Refug. Botan.," tab. 32. "Illustration Horticole," 8, tab. 271. Jordan and Fourreau, "Icones Plant. Europ.," 1, pl. 100.

One of the most noble of Sedums. Its very large flat panicles of pinkish flowers set among the pale glaucous foliage render it a valuable plant for the border in autumn. Common in cultivation it is not easily confounded with any other species. The very long stamens, exceeding the petals, alone will distinguish it if any doubt exists. As in several of the *Telephium* group, the arrangement of the leaves varies, but they are generally in opposite pairs or in threes.

Under the names of var. *atropurpureum*, var. "Brilliant," etc., forms with deeper-coloured flowers are offered for sale, which are generally regarded as improvements on the pink-flowered type. Like several of the *Telephium* group, it prefers a heavier soil than suits the majority of Sedums.

DESCRIPTION.—A robust glaucous herbaceous perennial, 1-1½ feet high. Root of several carrot-shaped tubers. Stems erect, stout, leafy, unbranched, smooth, round. Leaves usually opposite or ternate, wide-spreading, subsessile, obovate, about 3 inches long by 2 inches broad (up to 5 by 3), fleshy, rather weakly and distantly toothed, slightly wedge-shaped below. Inflorescence a very large flat-topped dense corymb, 4-6 inches across, pedicels rather shorter than the flowers. Buds pointed, thrice as long as broad. Flowers pink, very numerous, $\frac{1}{4}$ inch across. Sepals whitish-green, lanceolate, $\frac{1}{4}$ the petals, separate nearly to the base. Petals pink, lanceolate, acute, semi-erect or patent, $\frac{1}{4}$ inch long. Stamens rather variable in length, those opposite the petals slightly exceeding them, those between the petals $\frac{1}{4}$ longer than the others; anthers purple. Scales whitish, cuneate, emarginate. Carpels erect, pink, slightly shorter than the petals, erect in fruit.



FIG. 43.—*S. spectabile* Boreau.

Flowers September–October. Hardy.

HABITAT.—Japan ; Central China (DIELS) ; long cultivated in the latter country, but till lately not certainly known there in the wild state.

The name *spectabile* refers to its notable appearance.

Group 2. VERTICILLATA.

29. *Sedum verticillatum* Linn. (fig. 44).

S. verticillatum Linn. "Species Plant.," 430, 1753. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 139, 1883. Bongard in "Mém. Acad. Pétersbourg," ser. 6, 3, 85, 1835. Not *S. verticillatum* Hamet which = *Triactina verticillata* Hooker fil. and Thomson.

ILLUSTRATIONS.—Linnaeus, "Amoen. Academicae," ed. 2, 2, tab. 4, fig. 14. Bongard, *loc. cit.* tab. 7.

Easily recognized among the cultivated Sedums of the Telephium section by its comparatively narrow-stalked leaves in whorls of 4 or 5 and its green flowers.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, with fleshy spindle-shaped roots. *Stems* annual, erect, smooth, green, round, simple or with a few axillary branches above, 1–2 feet high. *Leaves* whorled, the lower ones often opposite or ternate, the upper in whorls of 4 or 5, oblong-lanceolate, narrowed at both ends, stalked, obscurely and bluntly toothed, smooth, green, pale below, only slightly fleshy, minutely dotted purple, 2–3 inches long, $\frac{1}{4}$ –1 inch broad, petiole $\frac{1}{4}$ inch or more. *Inflorescence* corymbose, terminal, very dense, roundish on surface, sparingly leafy, 2–3 inches across, pedicels slender, equalling the flowers. *Buds* ovate, blunt. *Flowers* green, $\frac{1}{4}$ inch across. *Calyx* cup-shaped, green, fleshy, lobes deltoid-lanceolate, rather acute, tube very short. *Petals* pale green, wide-spreading, ovate-lanceolate, acute, 4 times the sepals. *Stamens* slightly exceeding the petals, the epipetalous ones adnate in the lower third and shorter than the others, filaments pale green, anthers buff or pale red. *Scales* nearly twice as long as broad, linear-cuneate, retuse, yellow. *Carpels* stout, green, erect, equalling the petals, styles short.

Flowers September. Hardy.

HABITAT.—Japan, Kamtschatka.

Several of the East Asiatic species of the Telephium section have leaves arranged in whorls of three to five, but the present is the only one which appears to be in cultivation. I owe my plants to the kindness of Professor MIYABE of Sapporo University Botanic Garden. My plants, when young or when the inflorescence does not develop fully, tend to produce in autumn numerous small axillary buds above, after the manner of the nearly allied *S. viviparum* Maxim.

Named from its whorled leaves.

Var. *nipponicum* Praeger in *Journ. of Bot.*, 56, 152, 1918.

S. alboroseum Baker, f., Maximowicz in *Bulletin Acad. St. Pétersbourg*, 29, 141, 1884.

A dwarf slender form of *S. verticillatum* with opposite leaves grown at Kew under the name *S. latifolium* (a synonym of *S. maximum* L.) is clearly the plant which MAXIMOWICZ alludes to (*loc. cit.*) under *S. alboroseum* and which he would have placed under *verticillatum* but for its



FIG. 44.—*S. verticillatum* Linn.

opposite leaves. A study of the growing plant shows that it is certainly a form of *verticillatum*, with which it agrees in all points save its smaller size and the arrangement of its leaves; the flowers, leaves, colour, and habit are those of *verticillatum*. Young and weak plants of *S. verticillatum* often have their leaves opposite, and in this dwarf form this immature character seems perpetuated. Doubtless a wild Japanese form, but so far known only from gardens in Japan and England.

Series II. HUMILICAULES.

Group I. ARCUATAE.

30. *Sedum Ewersii* Ledebour (fig. 45).

S. Ewersii Ledebour "Flora Altaica," 2, 191, 1830. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 136. Masters in *Gard. Chron.*, 1878, ii. 591. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 102. Clarke in Hooker "Flor. Brit. India," 2, 421.

ILLUSTRATIONS.—Ledebour, "Icones Plant. Ross.," tab. 58. Regel, "Gartenflora," tab. 295. Wooster, "Alpine Plants," 1, pl. 30. *Trans. Russian Hort. Soc.*, 1860, tab. 21.

A well-known species, long in cultivation, distinguished among the purple-flowered Sedums by its semi-trailing habit and opposite pairs of entire clasping leaves. Unlike most of the *Telephium* section, the new stems arise, not from buds at the base of the old stem, but from the lower part of the stems themselves, so that eventually a much-branched, low twiggy mass is formed, which is bare in winter.

DESCRIPTION.—A glaucous herbaceous perennial, dying back in winter to a short spreading, much branched twiggy rootstock. *Stems* round, smooth, unbranched, the barren ones spreading, the flowering ones longer (6–12 inches) ascending or spreading. *Leaves* sub-opposite, entire or faintly toothed, fleshy, glaucous, sessile, about $\frac{3}{4}$ inch long by $\frac{1}{2}$ inch broad, those of the barren shoots and the lower ones of the flowering shoots orbicular to broadly ovate or obovate, rounded and not clasping at the base, longer than the internodes; upper leaves of the flowering shoots cordate and clasping, shorter than the internodes. *Inflorescence* a dense terminal umbellate cyme, 1–2 inches across, surface convex. *Buds* ovoid, bluntly pointed. *Flowers* purplish pink, nearly $\frac{1}{2}$ inch across, as long as the pedicels. *Sepals* linear-lanceolate, separate nearly to the base, glaucous. *Petals* ovate-lanceolate, acute, purplish pink, more than twice the sepals, wide-spreading, the nerve on back green near the tip. *Stamens* shorter than the petals, filaments pink, anthers dark purple. *Scales* whitish or yellowish, oblong, notched. *Carpels* erect, pink, shorter than the stamens, erect in fruit.

Flowers August–September. Hardy.

HABITAT.—Western Himalayas to the Altai, Soongar, and Mongolia.

Var. *homophyllum* var. nov.* (fig. 46).

Much smaller than the type. *Stems* 2–3 inches long, flowering ones but little longer than the barren ones; shoots dying back less far in proportion during winter and producing many very short, small shoots below. *Leaves* of both

* Quam typo multo minus. *Caules* 5–8 cm. longi; *caules floriferi* *caules steriles* parum superantes. *Folia* *caulium sterile* et *floriferorum integra*, obovata, nec amplexicaulia, 13–16 mm. longa, 6–9 mm. lata, quam in typo glauciora. *Folia* emarcida persistentia. *Pedicelli* quam in typo longiores, graciliores; *carpella* paullum majora, *stamina* aequantia.



flowering and barren shoots entire, usually obovate, not clasping, $\frac{1}{2}$ – $\frac{5}{8}$ inch long by $\frac{1}{4}$ – $\frac{3}{8}$ inch broad, more glaucous than in the type; withered leaves persistent in winter. Flowers as in type, save that the pedicels are longer and slenderer, and the carpels rather larger, equalling the stamens.

A curious little plant, found in gardens under the name of *S. cyaneum*, but quite different from *S. cyaneum* Rudolph. I was at first inclined to treat it as a distinct species, but its flowers are practically identical

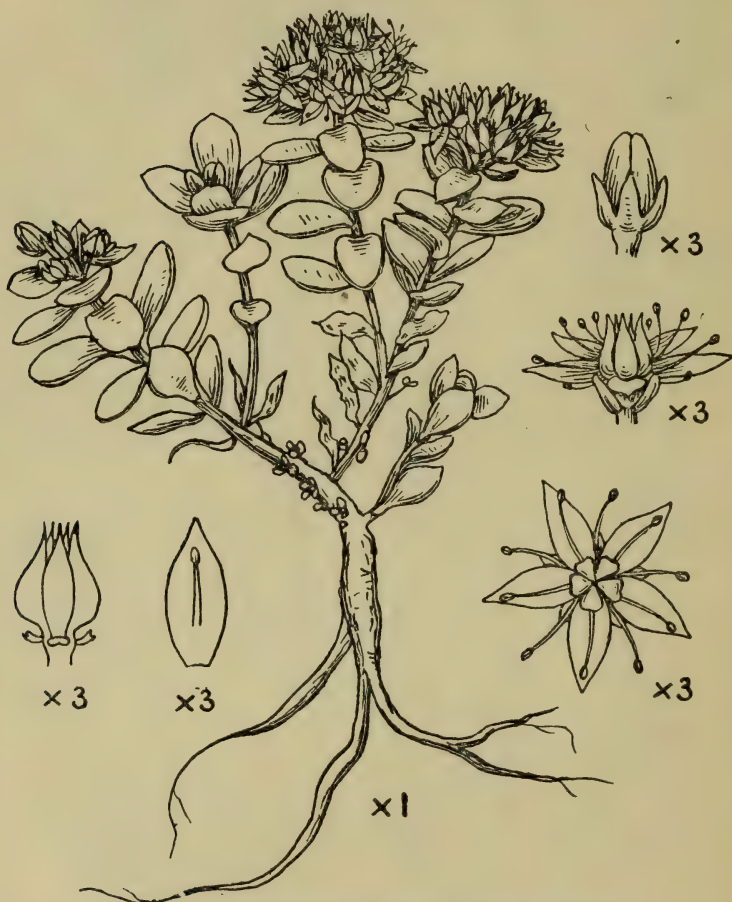


FIG. 46.—*S. Ewersii* Ledeb. var. *homophyllum* nov.

with those of *S. Ewersii*, and its leaves with those of the barren shoots of that species. It is a dwarf form of *Ewersii*, in fact, in which the characteristic elongate flowering shoots with long internodes and clasping leaves are not produced, the flowers (to use an Irish bull) being borne on the barren shoots. It differs also from typical *Ewersii* in being a very shy flowerer.

"Var. *turkestanicum*" is a garden name found in many nurserymen's lists, sometimes as a species. None of the plants which I have seen under the name were in any way distinct, or worthy of varietal rank.

S. Ewersii is a well-known garden plant, exhibiting very little variation. Var. *homophyllum* I have had from Kew, Wisley, the Chelsea Physic Garden, and Mr. E. A. BOWLES, in all cases under the name *cyaneum*. For the true *S. cyaneum*, see p. 106.

31. ***Sedum cauleolum*** Praeger (figs. 47*b*, 48).

S. cauleolum Praeger in *Journ. of Bot.*, 54, 41, 1917.

Nearest to the well-known *S. Sieboldii*, from which it differs in its opposite stalked (not ternate sessile) leaves, lax leafy inflorescence,

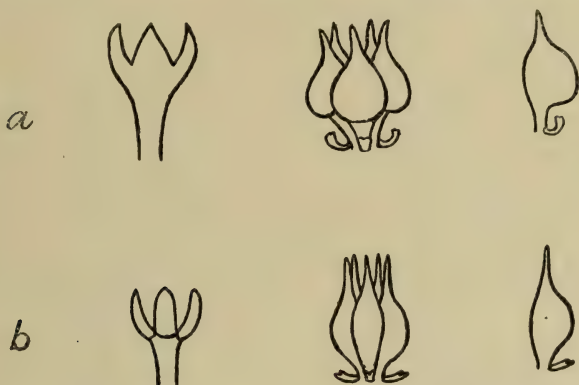


FIG. 47.—Sepals and carpels of (a) *S. Sieboldii*, (b) *S. cauleolum*.

carpels tapered below (not abruptly contracted into a short stalk), and other characters.

DESCRIPTION.—A glaucous herbaceous perennial. *Rootstock* rather thickened, emitting several stems above and several long fleshy tapered roots below, and also slender white subterranean shoots, bearing opposite small colourless scale-like leaves; these shoots come to the surface and produce stems several inches from the parent plant. *Stems* slender, procumbent or low-arching, about 6 inches long, smooth, round, dark purple. *Leaves* opposite (occasionally alternate), glaucous, paler on back, finely dotted with purple, especially on back, orbicular-spathulate, 1 inch long by $\frac{3}{4}$ inch broad, very blunt at apex, bearing about two blunt teeth on each side in the upper part, narrowed below to a distinct petiole. *Inflorescence* a terminal lax very leafy flattish umbellate cyme, the uppermost bracts rhomboid-lanceolate; pedicels very slender, exceeding the flowers. *Buds* ovate-lanceolate, blunt, ribbed, the ribs glaucous green, the furrows red. *Flowers* $\frac{1}{2}$ inch across, rosy purple. *Sepals* small, glaucous, linear-lanceolate, acute, dotted purple, divided to the base. *Petals* 4 times the sepals, lanceolate, acute, concave, wide-spreading, on face rosy purple turning white at base, on back purple along the edges, whitish dotted purple down the centre. *Stamens* equalling the petals, filaments pink, anthers red. *Scales* straight, wide-spreading, oblong, retuse, colourless. *Carpels* erect, slightly shorter than the stamens, bright rosy purple mottled white, cuneate below, styles erect nearly equalling the ovaries.

Flowers September-October. Hardy.

HABITAT.—Cliffs of southern coast of Yezo, Japan.

A pretty and interesting species, sent by Prof. MIYABE from the University Botanic Garden of Sapporo with the note "sp. aff. *S. Sieboldii* with opposite leaves and early-flowering habit." In British

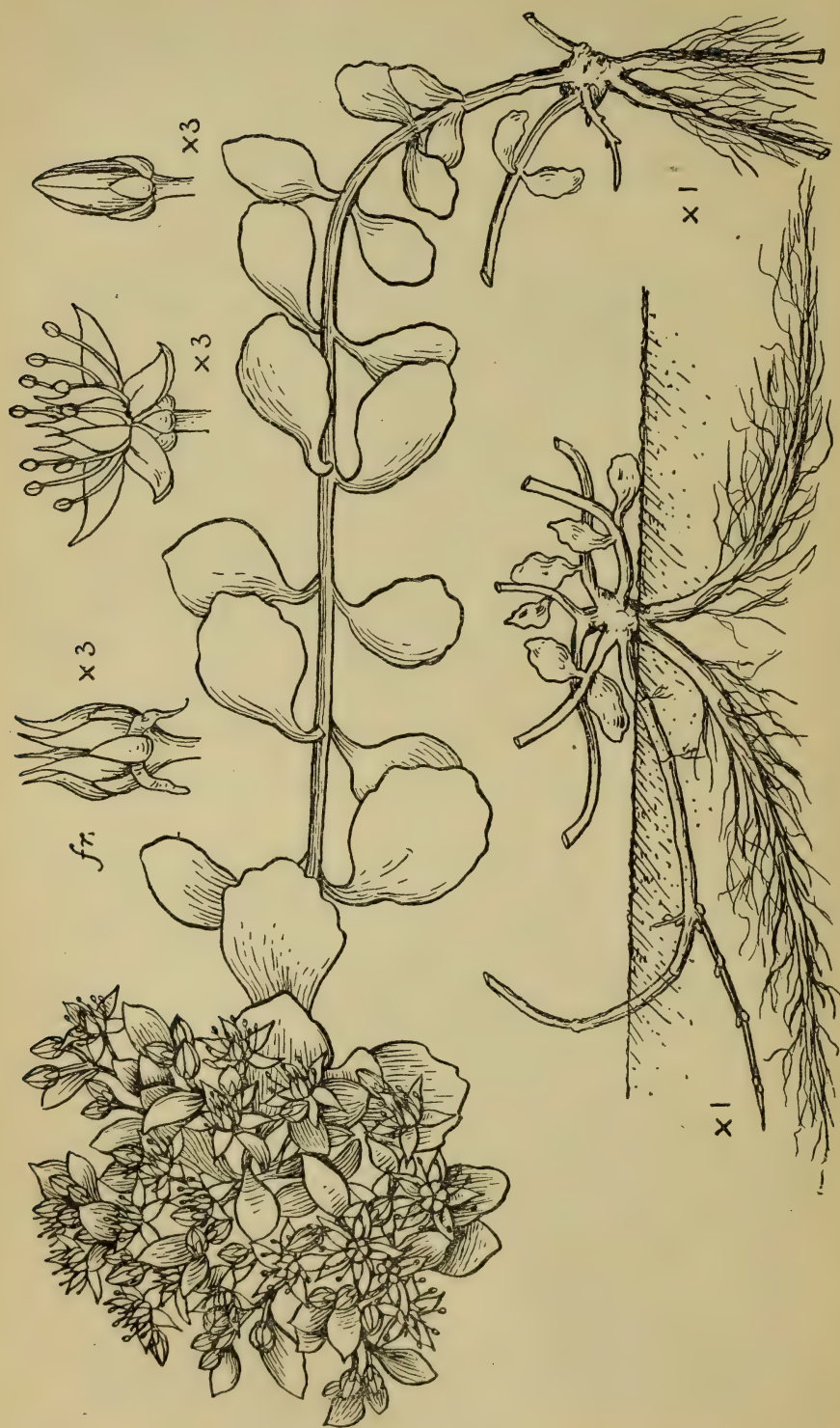


FIG. 48.—*S. caucasicum* Praeger.

gardens it commences to bloom in September, three weeks before the well-known *S. Sieboldii*.

Named from its growing on cliffs.

32. *Sedum Sieboldii* Sweet (figs. 47a, 49).

S. Sieboldii Sweet ex Hooker, *Bot. Mag.*, tab. 5358, 1863. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 136. Masters in *Gard. Chron.*, 1878, ii. 591.

ILLUSTRATION.—*Bot. Mag.*, loc. cit.

A handsome Japanese member of the *Telephium* group, first described from English specimens cultivated as long ago as 1839. Its arching habit, roundish sessile glaucous leaves in threes, and rosy-purple flowers, distinguish it from any other species. It is the last to flower of all the Old World Sedums.

DESCRIPTION.—A glaucous herbaceous perennial. *Root* a tuft of small carrot-like tubers. *Stems* many, unbranched, 6–9 inches long, low-arching, smooth, round, red. *Leaves* ternate, sessile or subsessile, nearly orbicular, slightly cuneate below, fleshy, flat or concave, glaucous, sometimes flushed red, margin sinuate or bluntly toothed in upper half, red. *Inflorescence* a compact terminal flattish umbellate cyme about 2 inches across, with many small ovate bracts; pedicels enlarged upwards, about as long as the flowers. *Flowers* nearly $\frac{1}{2}$ inch across, pink. *Buds* obovoid, purplish, with red markings and greenish ribs. *Sepals* deltoid, acute, dark green, separate nearly to the base. *Petals* thrice the sepals, pink, broadly lanceolate, acute, spreading, minutely hooded at the tip. *Stamens* spreading, the epipetalous ones equalling the petals, the others slightly longer, filaments pink, anthers purple. *Scales* oblong, truncate, curving upwards, flushed orange except when young, entire or slightly emarginate. *Carpels* short, broad, erect, pink with linear markings of a deeper tint, abruptly narrowed below into a distinct white stalk, styles short.

Flowers October. Hardy.

HABITAT.—Japan.

It is hardy, but is most frequently seen as a greenhouse or cottage-window plant. Slugs are fond of it. Its nearest ally is *S. caucicum*, which differs in its opposite stalked leaves, leafy inflorescence of darker flowers, and other minuter characters. Named in honour of P. F. VON SIEBOLD (1796–1866), author of valuable works on the flora of Japan.

f. *foliis medio-variegatis*.

A form with a large splash of yellow occupying the middle of the leaf. A favourite pot-plant. A good coloured plate will be found in "Illustration Horticole," tab. 373.

33. *Sedum Tatarinowii* Maximowicz (fig. 50).

S. Tatarinowii Maximowicz in *Bull. Acad. Pétersbourg*, 29, 134, 1883.

A pretty species, with fleshy leaves of a distinctive shape—narrowly lanceolate with large teeth—and terminal clusters of pinkish flowers.

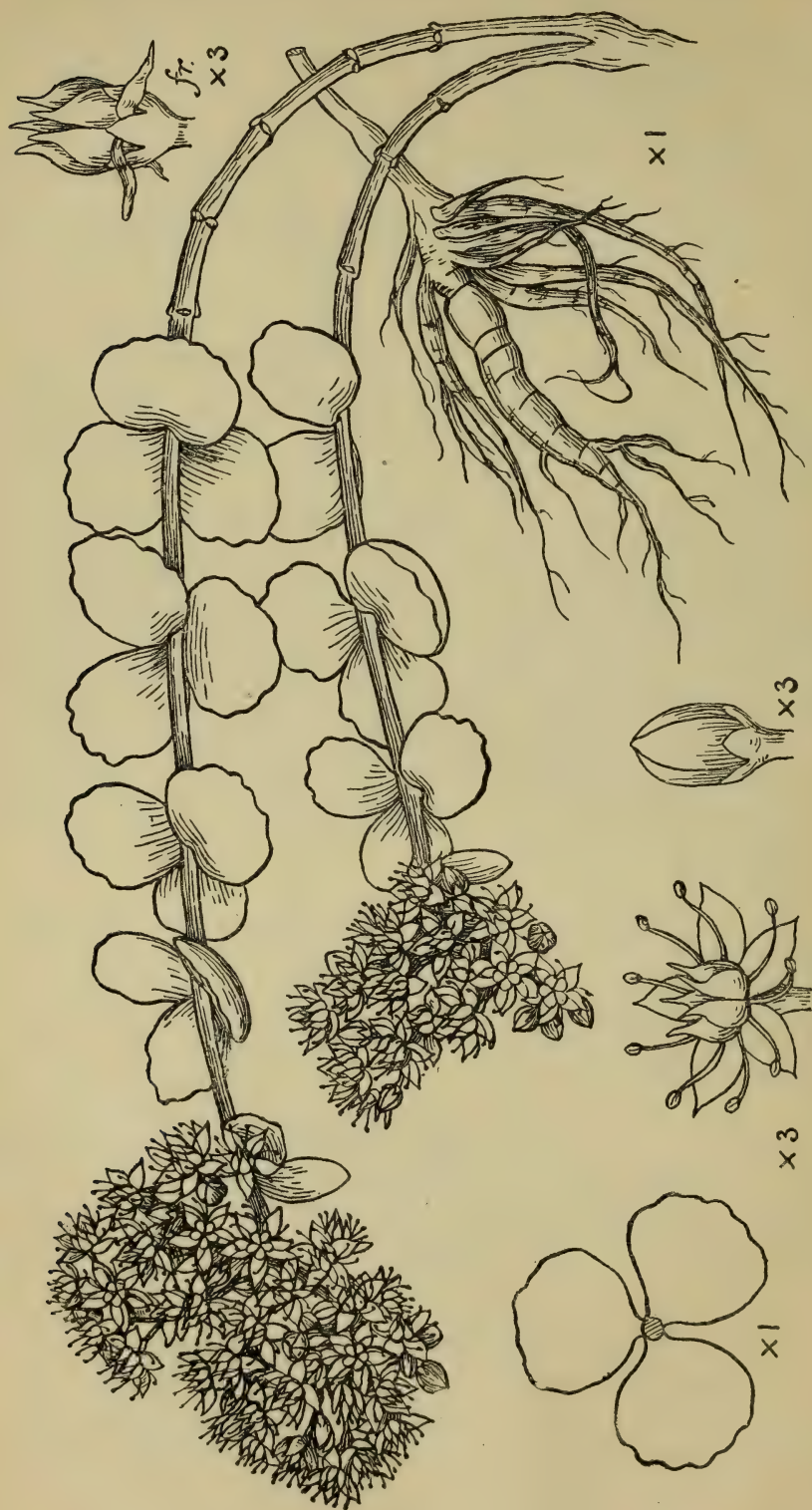


FIG. 49.—*S. Sieboldii* Sweet.



FIG. 50.—*S. Tatarinowii* Maxim.

It may be recognized by its thickened rootstock with tuber-like roots—characteristic of the *Telephium* group—and its leaves and flowers as above.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thickened, with small carrot-shaped tuberous roots. *Stems* annual, many, 4–6 inches long, erect or arching, round, smooth, unbranched, leafy. *Leaves* alternate, fleshy, shortly stalked, linear-lanceolate, blunt, flat on face, rather rounded on back, $\frac{1}{2}$ to 1 inch long, with a few large scattered teeth; upper leaves narrower, very fleshy. *Inflorescence* flattish, corymbose, 1 inch or more across, rather dense. *Buds* ovate, blunt, pink. *Flowers* shorter than the pedicels, $\frac{1}{2}$ inch across. *Sepals* green, fleshy, linear, rather acute. *Petals* 4 times the sepals, ovate-lanceolate, acute, wide-spreading, pinkish white. *Stamens* spreading, shorter than the petals, filaments white, anthers purple. *Scales* white, longer than broad. *Carpels* white, erect, equalling the stamens, erect in fruit; styles pink.

Flowers July–August. Hardy.

HABITAT.—North China.

A pretty plant, not in cultivation, so far as I am aware, until 1913, when Mr. F. N. MEYER, of the American Legation at Peking, sent to Kew specimens collected by him at 3,000 mètres at Hsiao Wutai Shan, Chihli, China. Named after ALEXANDER TATARINOW, author of a catalogue of Chinese drugs (1856).

Group 2. REPENTES.

34. *Sedum Anacampseros* Linn. (figs. 51, 52).

S. Anacampseros Linn., "Species Plantarum," 430, 1753. Masters in *Gard. Chron.* 1878, ii. 591.

SYNONYM.—*S. rotundifolium* Lamarck, "Flor. Française," 3, 83, tab. 8.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 33. Lamarck, *loc. cit.* "Bot. Mag.," pl. 118. Reichenbach, "Flor. German.," 23, tab. 48. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 8. Plenck, "Icones Plant. Medicinalium," tab. 353.

A well known and distinct garden plant, abnormal in the *Telephium* section in its creeping habit and the presence of barren shoots. Its long, sinuous, bare, decumbent stems, entire rounded leaves, and dense heads of dull purple flowers, sufficiently distinguish it.

It occurs in two forms:—(a) *TYPICA*, with orbicular to obovate glaucous leaves about $\frac{3}{4}$ inch long by $\frac{3}{8}$ inch broad and prostrate habit; and (b) *MAJUS* mihi, of stronger, more erect growth with longer greener leaves (up to 1 $\frac{1}{2}$ inch long by $\frac{1}{2}$ inch broad) and larger inflorescence.

DESCRIPTION.—A procumbent glaucous semi-evergreen perennial. *Stems* long, procumbent, occasionally rooting, sinuous, bare below, smooth, round, ascending and leafy above, the flowering shoots about 6 inches high. *Leaves* of barren shoots alternate, sessile, flat, comparatively thin, entire, obovate to orbicular, rounded above, sometimes slightly retuse or apiculate, $\frac{1}{2}$ –1 inch long by $\frac{1}{2}$ – $\frac{3}{4}$ inch broad, tapered below; those of the flowering shoots larger, ovate, cordate, with a small flat spur. *Inflorescence* cymose, very dense, surface convex. *Buds* ovate, blunt, plum-colour. *Flowers* not opening widely, $\frac{1}{4}$ inch across, dull purple, shorter than the pedicels. *Sepals* lanceolate, blunt, glaucous, separate nearly to the base. *Petals* purple on face, glaucous-purple on back, ovate-lanceolate, blunt, $\frac{3}{10}$ inch long, $\frac{1}{2}$ longer than the sepals. *Stamens* equalling the petals, filaments purple, anthers yellow or purplish. *Scales* spatulate, thrice as long as broad. *Carpels* erect, equalling the stamens, styles short.



FIG. 51.—*S. Anacampseros* f. *majus* Praeger.

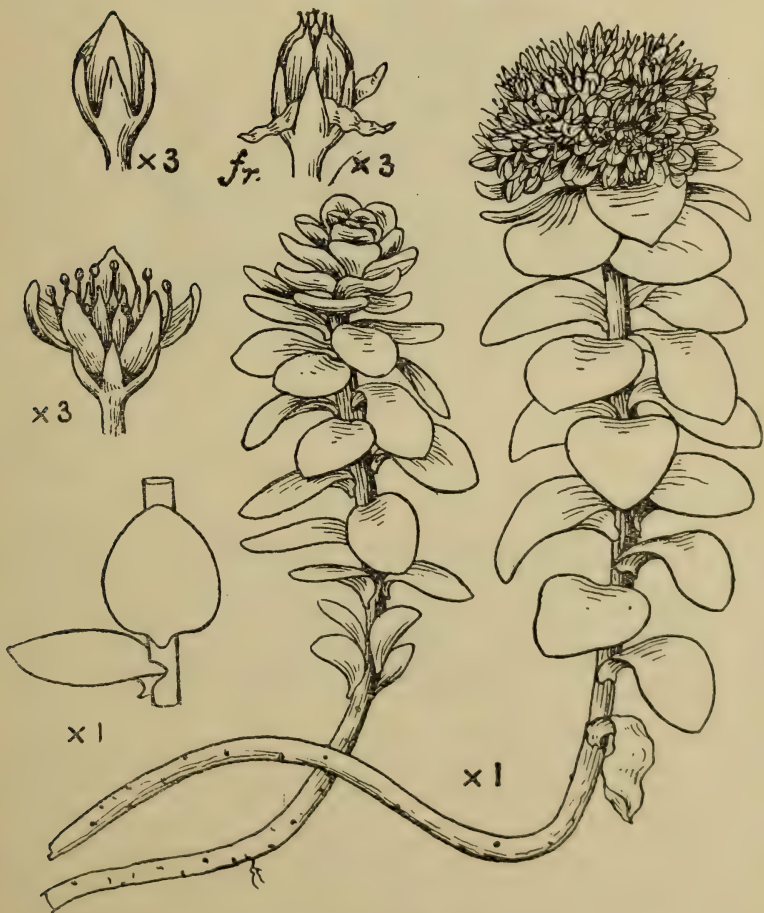


FIG. 52.—S. *Anacampseros* Linn.

Flowers July–August. Hardy.

HABITAT.—Alpine rocks from N. Spain to the Tyrol. The form *majus* has been sent to me from the Alps by Mr. E. A. BOWLES along with the type, and I have seen it in several gardens.

The name *Anacampteros* is that of a genus of Portulacaceae, and is derived from the Greek *anakampto*, “to cause return,” and *eros*, “love.”

35. *Sedum cyaneum* Rudolph (fig. 53).

S. cyaneum Rudolph in *Mém. Acad. Pétersbourg*, 4, 341, 1811. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 135.

ILLUSTRATION.—Rudolph, *loc. cit.*, t. 2. Regel, “Gartenflora,” tab. 972, fig. 2.

Much the smallest of the *Telephium* section, but with the characteristic facies of that group, and recognizable by its entire glaucous



FIG. 53.—*S. cyaneum* Rudolph.

obovate-oblong leaves and heads of rosy purple flowers. Somewhat resembles the var. *homophyllum* of *S. Ewersii*.

DESCRIPTION.—A small creeping deciduous glaucous perennial 2-3 inches high in flower. Stems slender, prostrate, creeping, branched. Leaves alternate or opposite, flat, fleshy, sessile, entire, blunt, $\frac{2}{5}$ – $\frac{4}{5}$ inch long, $\frac{1}{8}$ – $\frac{1}{4}$ inch broad, the lower obovate-oblong, those of the flowering shoots oblong or oblong-linear. Inflorescence a terminal, rather lax corymb. Flowers openly campanulate, rosy lilac. Sepals ovate-oblong, half the petals. Petals $\frac{1}{2}$ inch long, ovate. Stamens 10, the epipetalous ones adnate $\frac{1}{2}$ way up, equalling the petals, the others longer. Scales thick, cuneate-linear. Carpels shortly stalked, lanceolate, with slender styles.

HABITAT.—Siberia, Kamtschatka.

Very rare in cultivation. REGEL (*loc. cit.*) figured it from living specimens, and it was included in Regel and Kesselring's sale list. Plants received from them did not grow. I have seen it in Miss WILLMOTT's garden at Warley, but during several years it has not flowered with her, nor did plants which she kindly gave me produce blossom. The above description is therefore taken mainly from MAXIMOWICZ (*loc. cit.*).

The figure (fig. 53), such as it is, conveys an idea of the appearance of the plant, the barren shoots being drawn from the living plant, and the inflorescence added from the plate in "Gartenflora."

Apparently the leaves are irregular in their arrangement. RUDOLPH and MAXIMOWICZ say they are alternate ; so does LEDEBOUR (*Fl. Rossica*, 2, 182). REGEL figures them as opposite, but says alternate in the accompanying description. In Miss WILLMOTT's plant they are opposite.

Named from the lilac-glaucous hue of the leaves.

SECTION IV.—GIRALDIINA.

[Section GIRALDIINA Diels in *Engler's Bot. Jahrb.*, 36, Beibl. 82, p. 48, 1905.

Founded to include two Chinese species—*S. Scallanii* Diels and another undescribed. Allied to section Telephium, but differing especially in possessing only five stamens. Neither species is in cultivation.]

SECTION V.—AIZOON.

Section AIZOON Koch, *Synopsis*, 259, 1836.

Perennial. Rootstock thickened, roots slender. Stems annual (except *S. hybridum*). Leaves flat. Flowers hermaphrodite, 5-parted, bright yellow. Hardy East Asiatic plants.

A small and compact group confined to N. and N.E. Asia. The species vary considerably in habit, from tall and erect to creeping, but the flowers, and in most cases the leaves, are very similar. Seven out of the nine species are in cultivation. The two not in cultivation are *S. Sikokianum* Maxim., resembling a slender *S. kamtschaticum*, and *S. Yabe anum* Makino, the only one of the section with entire leaves ; both are natives of Japan.

Aizoon Linn.

kamtschaticum Fisch. and Meyer.

Selskianum Regel.

floriferum Praeger.

Middendorffianum Maxim.

hybridum Linn.

Ellacombianum Praeger.

MAXIMOWICZ divided *S. hybridum* from the rest by its fruiting carpels "lanceolati basi connati erectopatuli," those of the others being "oblique ovati ad $\frac{1}{3}$ imam v. ultra connati indeque stellatopatientes." In fig. 54 the full-grown fruit of the species in cultivation has been drawn (excepting *S. Selskianum*, of which good fruit was not available), one carpel being removed to show the amount by which they are connate. It will be seen that the characters used by MAXIMOWICZ are evident, but that they are not at all striking, a well-marked gradation being observable ; this gradation does not accord well with characters of flower, stem, and leaf. The group, indeed, does not

divide itself naturally into sub-groups, though many of the species stand out clearly by individual characters—*Selskianum* by its dense hairiness, *floriferum* by its much-branched stems, *hybridum* by its

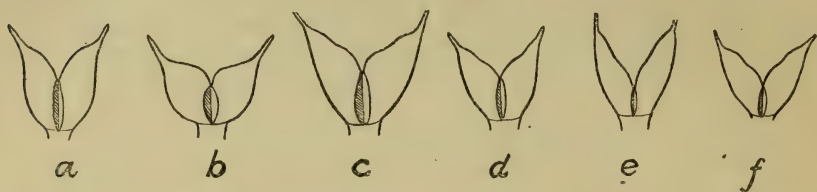


FIG. 54.—Carpels of species of *Aizoon* section (the front one removed to show degree of attachment). *a*, *S. Aizoon*; *b*, *Ellacombianum*; *c*, *kamtschaticum*; *d*, *floriferum*; *e*, *hybridum*; *f*, *Middendorffianum*. All $\times 2$.

creeping stems and barren shoots. *Aizoon* and *hybridum* vary greatly in some characters, and *Middendorffianum* has two distinct forms: this tends to render more difficult the separation of this closely allied group of species.

36. *Sedum Aizoon* Linn. (figs. 54a, 55, 56).

S. Aizoon Linn., "Species Plantarum," 430, 1753. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 143, 1883. Masters in *Gard. Chron.*, 1878, ii. 267.

SYNONYMS.—*S. Maximowiczii* Regel, "Gartenflora," 1866, 353, tab. 528. Masters in *Gard. Chron.*, 1878, ii. 268. *S. Woodwardii* N. E. Brown in *Kew Bulletin*, 1912, 390. *S. Selskianum* of many gardens (not of Regel and Maack, see p. 112). *S. Lageri* (a *nomen nudum*) of some gardens.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 101. Regel, "Gartenflora," tab. 528 (as *Maximowiczii*).

An old garden plant, usually grown under the name *Maximowiczii* or *Selskianum*. (Other names under which the plant came to me are *aizoideum*, *Alberti*, *asiaticum*, *euphorbioides*, *kamtschaticum*, *Lageri*, *scabrum*, and *Wallichianum*.) The only species with which it might be confounded is the true *Selskianum*, but the latter is hairy all over, and has narrower leaves and smaller flowers borne in larger numbers. *S. Aizoon* is unique among the well-marked group to which it belongs, in its thickened carrot-like tuberous roots, which resemble those which characterize the *Telephium* section; these are well shown in a young plant, as figured (fig. 56). It is generally at once recognizable by its group of stout, erect, smooth stems a foot or more high, and dense flat cymes of yellow flowers.

DESCRIPTION.—A glabrous herbaceous perennial, quite leafless in winter, without barren shoots. *Rootstock* large, thick and knotted. *Roots* elongate, fleshy and tuberous. *Stems* arising in spring from the rootstock, several or many, erect, smooth, subangular, green, usually turning brown abruptly towards the base, unbranched or with axillary branches above, 1–1½ foot high. *Leaves* linear-lanceolate to ovate-lanceolate, alternate, 2–3 inches long, usually rather blunt, sharply toothed above, narrowing at base to a short stalk, green, midrib prominent on the paler underside. *Inflorescence* a dense terminal flattish leafy cyme 1½–3 inches across, of about 5 forked branches with flowers in the forks, leaves often forming a loose involucre. *Buds* ovate-oblong, often acute. *Flowers*



FIG. 55.—*S. Aizoon* Linn.

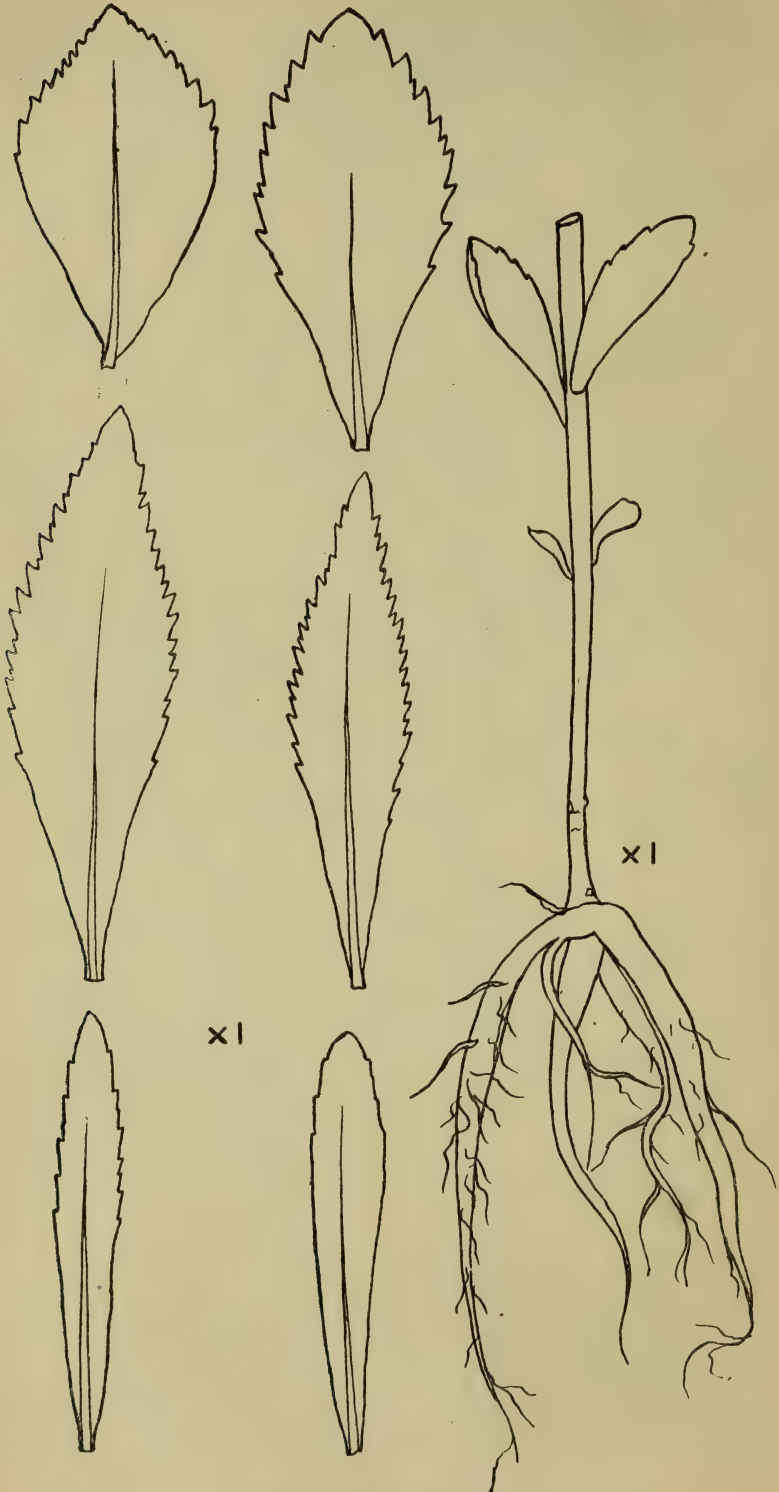


FIG. 56.—*S. Aizoon* Linn.

sessile, yellow to orange, $\frac{1}{2}$ inch across. *Sepals* green; linear, blunt, and terete in upper half; widening below to a broad base. *Petals* nearly twice the sepals, linear-lanceolate, apiculate, yellow to orange, wide-spreading. *Stamens* spreading, nearly equalling the petals, yellow, anthers ovate. *Scales* white, broader than long. *Carpels* at first erect, spreading later, yellow, often becoming orange or red, spreading widely in fruit.

Flowers July. Hardy.

HABITAT.—Siberia, Mongolia, Manchuria, China, Japan.

S. Maximowiczii Regel is, according to Maximowicz (*loc. cit.*), whose knowledge of the North Asiatic Sedums was unequalled, the form of *Aizoon* found in cultivation in Japan—very tall, large-leaved, and large-flowered. Recent Japanese writers agree in this view.

S. Woodwardii N. E. Brown is undoubtedly referable to *S. Aizoon*. The type specimen in Kew Herbarium is poor, but by the kindness of the late Mr. ROBERT WOODWARD, in whose garden the plant appeared as a seedling, I received fine specimens taken from the original root. These represented a rather broad-leaved form, lax from growing in rich soil in half shade; each of the special characters—such as the rather obtuse dentition, obliquely obovate leaves, and very lax inflorescence—on which the species was founded, has disappeared when the plant has been grown under ordinary conditions in my garden, and the plant as now growing differs in no way from ordinary *S. Aizoon*. (See *Journ. of Bot.*, 55, 215.)

Several varieties of *S. Aizoon* have been described, based on differences in stem and leaf characters, such as var. *latifolium* Maximowicz, "Flor. Amurensis," 115, and Regel, "Flor. Ussuriensis" 70, a small branched form with very large leaves; var. *saxatilis* Nakai, "Flor. Koreana," small and branched with narrow leaves; and var. *floribunda* Nakai *loc. cit.*, very tall and narrow-leaved. These may be of importance locally as geographical forms, but in the garden a continuous range is found, among which it is not possible to select any as outstanding and worthy of varietal names in a botanical sense. My collection came from some fifty different garden sources, ranging from Japan on the east to Canada on the west. Among them the chief variations observed were as follows:—

(1) Habit.—Some very erect, some rather diffuse.

(2) Branching.—A strong stem will often bear many axillary branches, and any stem will branch if the growing point is injured, but some forms were branched invariably.

(3) Inflorescence.—Typically terminal, very compact, involucrate; but the cyme-branches may be lengthened, producing with the enlarged leaf-like bracts a lax flat inflorescence 6 inches across; or the terminal flower-head, in conjunction with others borne on axillary branches, may form a hemispherical inflorescence half a foot across.

(4) Leaf-form.—Outline from linear-lanceolate to broadly ovate (see fig. 56), and dentition from obscure to bold, and from blunt to acute.

(5) Pigmentation.—From bright green in stem and leaf, clear yellow in flower, and bright green in fruit, to dark red in stem, dark green in

leaf, deep orange in flower, and red in fruit, the highly pigmented condition being known in gardens as var. *aurantiacum*; it forms a handsome plant, and for cultural purposes deserves its distinguishing name.

Var. *scabrum* Maximowicz is scabro-papillose throughout, and common in some parts of China; but I have not observed any tendency in this direction among the cultivated forms.

Aizoon is the name of a genus of Portulacaceae. The word signifies "always alive," and its application to a species of *Sedum* is obvious.

Hybrid S. *Aizoon* × *kamtschaticum* hybr. nov. (fig. 57).

DESCRIPTION.—*Rootstock* twiggly like *kamtschaticum*, rather than woody like *Aizoon*. New shoots arising in autumn from points near the base of the old stems and remaining short and leafy during the winter, as in *kamtschaticum*, not arising in spring from points on the woody rootstock as in *Aizoon*. *Stems* decumbent or ascending at base, remainder erect, resembling *kamtschaticum* below and *Aizoon* above, 6–8 inches long. *Leaves* lanceolate, serrate, in shape and colour identical with some *Aizoon* forms, not oblanceolate as in *kamtschaticum*, less toothed than typical *Aizoon*. *Inflorescence* rather lax, very leafy, of three dichotomous branches with flowers in the forks, resembling *kamtschaticum* rather than *Aizoon*. *Flowers* rich orange-yellow, $\frac{1}{2}$ – $\frac{5}{8}$ inch across, rather larger and brighter than typical *Aizoon*; in relative length of sepal to petal agreeing with *kamtschaticum*, not with *Aizoon*. Flowers in June, along with *kamtschaticum*, a fortnight before *Aizoon*. *Fruit* aborted, seeds sterile.

Hybrids are so rare in the genus *Sedum* that this plant is of some interest. *S. Aizoon* is a very variable species, but the exactly intermediate character of the present plant as between the two suggested parents, and the infertile seeds, render its hybrid origin almost certain, since *S. Aizoon* does not vary perceptibly in the direction of *kamtschaticum*, and since both parents are normally very free in their production of seed.

Probably a natural hybrid of garden origin. Received from Wisley (no. 45/15) as *kamtschaticum*, and a plant practically identical was seen in the Cambridge Botanic Garden.

37. *Sedum Selskianum* Regel and Maack (fig. 58).

S. Selskianum Regel and Maack in "Tentamen Flor. Ussuriensis," 66, 1861. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 145, 1883. Masters in *Gard. Chron.*, 1878, ii. 268.

ILLUSTRATIONS.—Regel and Maack, *loc. cit.*, tab. 6, fig. 9–11. Regel, "Gartenflora," tab. 361. *Trans. Russian Hort. Soc.*, 1862, tab. 87.

Nearest to *S. Aizoon*, which it resembles in habit, but easily known by its very hairy stems, hairy narrower leaves, and more numerous smaller flowers.

DESCRIPTION.—A hairy herbaceous perennial. *Stems* annual, arising in autumn, erect, 1–1½ foot high, rather slender, round, purplish, shaggy with spreading or deflexed white hairs half as long as the diameter of the stem; barren stems none. *Leaves*, alternate, flat, scarcely fleshy, sessile, bluntly pointed, toothed in upper half, dark shining green, finely hairy on both faces, ciliate, midrib hairy below, about 2 inches long, the lower lanceolate-oblong narrowed at base, the upper linear-oblong rounded at base. *Inflorescence* a large, very leafy dense umbellate cyme, 2–4 inches across, of about 5 twice-branched hairy branches; uppermost bracts lanceolate, very small. *Buds* ovate, acute, with



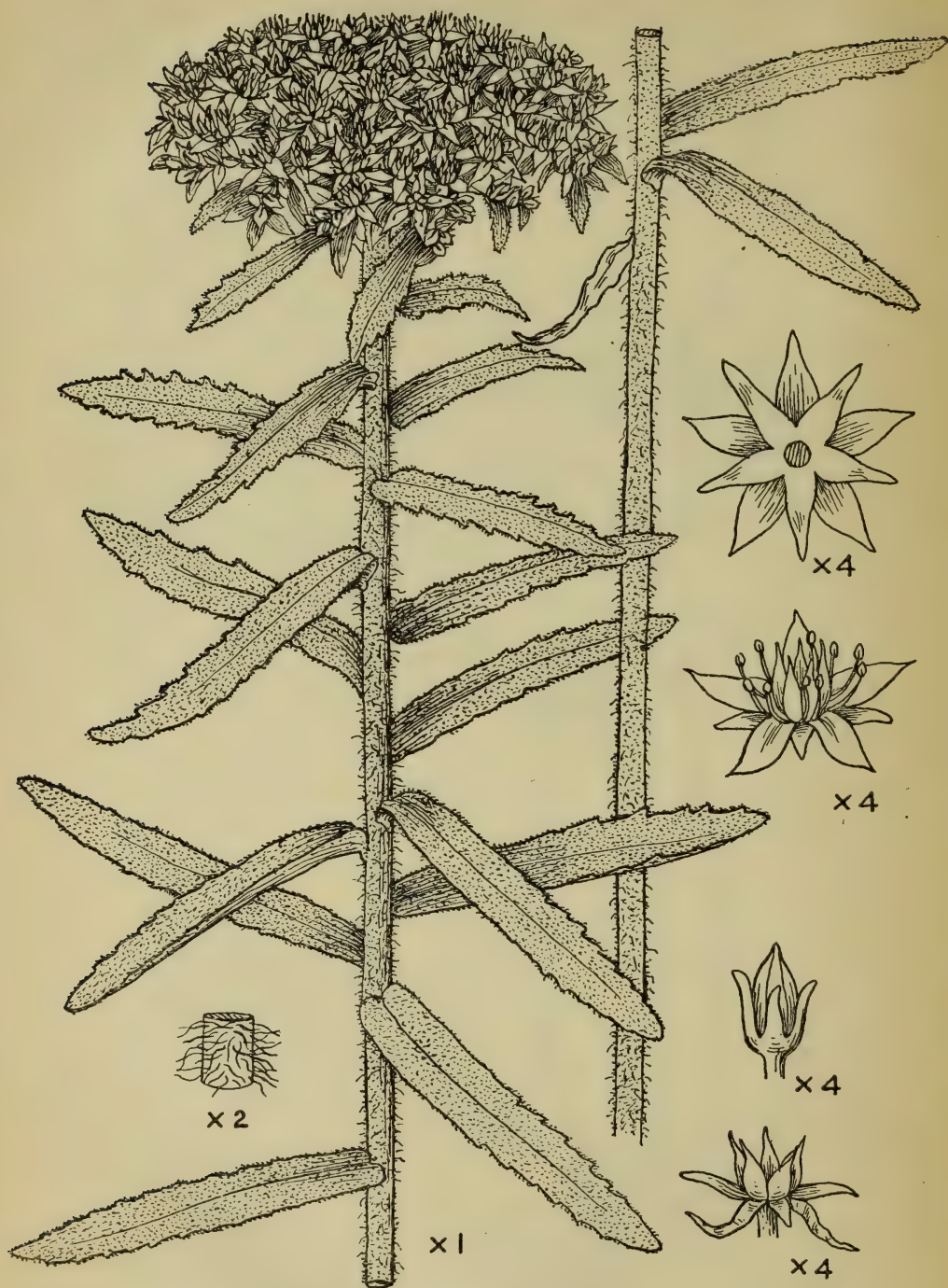


FIG. 58.—*S. Selskianum* Regel and Maack.

sepals spreading above. *Flowers* bright yellow, $\frac{3}{8}$ -inch across, pedicels very short, hairy. *Sepals* green, very fleshy, linear-lanceolate, usually glabrous, nearly erect, blunt, $\frac{2}{3}$ the petals, separate nearly to the base. *Petals* broadly lanceolate, acuminate or apiculate, wide-spreading, golden yellow. *Stamens* slightly shorter than the petals, the epipetalous ones free to the base, filaments yellow, anthers orange. *Scales* small, quadrate, yellowish. *Carpels* slender, nearly erect, equalling the stamens, tapering into the styles, contracted at the base, wide-spreading in fruit.

Flowers August. Hardy.

HABITAT.—Manchuria.

The plant is very rare in cultivation. The name is common enough in lists, and I obtained plants from a large number of different sources, but all were wrongly named, being mostly *Aizoon*, *kamtschaticum*, or *Ellacombianum*. I found the true plant at last in the Botanic Garden at Hamburg, and have to thank Dr. C. H. OSTENFELD of Copenhagen for kindly obtaining for me roots from there while direct communication was cut off owing to the war. MASTERS' remarks (*loc. cit.*, p. 268) seem to indicate that the plant was less rare in gardens forty years ago.

Named after ILARION SERGIEWITSCH SELSKY, Secretary of the Siberian branch of the Russian Geographical Society in Irkutsk.

38. *Sedum Middendorffianum* Maximowicz (figs. 54f, 59).

S. Middendorffianum Maximowicz, "Prim. Flor. Amurensis," 116, 1859.

Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 146, 1883. Masters in *Gard. Chron.*, 1878, ii. 267.

Allied to *Aizoon*, *Ellacombianum*, *kamtschaticum*. The type has narrower leaves than any of these, but the var. *diffusum* closely resembles in leaf some of the *hybridum* forms. From *Aizoon*, *Middendorffianum* is distinguished by its slenderer growth, narrower leaves bearing only a few teeth near the apex, smaller flowers, etc. The narrow leaves alone will distinguish it from the spatulate-leaved *Ellacombianum*. It differs from *kamtschaticum* in its unbranched stems, denser inflorescence and smaller flowers; *hybridum* stands apart in its creeping habit, many barren shoots, linear sepals and fruit not spreading horizontally; and *floriferum* differs in its branched stems and sepals linear or even broader above than below.

As pointed out by MAXIMOWICZ ("Primitiæ Flor. Amurensis," 116), there are two forms:—(1) with stems erect, crowded, comparatively short, densely leafy, leaves toothed near the apex, inflorescence compact; and (2) stems longer, decumbent, rooting at the base, leaves less crowded, very long, toothed from the middle up, inflorescence larger and more lax. As an additional character it may be added that the leaves of the second are usually broader than those of the first. Both these forms are in cultivation at Petrograd and in British gardens. Intermediates are rare, and the two differ so much in general appearance that it appears desirable to distinguish them. The original description of MAXIMOWICZ covers both plants; MASTERS applied the



FIG. 59.—a, *S. Middendorffianum* Maxim. ; b, *S. M.* var. *diffusum* Praeger.

name *minor* to the narrow-leaved form ; but it appears better that the form which MAXIMOWICZ mentions first (which is also that to which MIDDENDORFF's own specimens belong, and which is much the commoner in cultivation) should be taken as the type, and it is the plant of my description. The other form is described separately below.

DESCRIPTION.—A glabrous tufted perennial, without barren stems. The stems die down in autumn : next year's stems arise in late summer from near the base of these, remain short and leafy during the winter, shoot up, flower and die during the succeeding season. *Rootstock* thick, much branched upwards. *Stems* many, 6–12 inches, erect, round, smooth, slender, unbranched, leafy. *Leaves* numerous, alternate, spreading, narrow, concave, nearly linear, about $1\frac{1}{2}$ inch long by $\frac{1}{8}$ inch broad, sessile, fleshy, with several small teeth near the apex, entire in the lower two-thirds. *Inflorescence* a leafy flat-topped umbellate cyme, of several (usually 4) forked branches with flowers in the forks, about 1 inch across. *Bracts* leaf-like, the uppermost entire. *Buds* ovate, acute, ribbed. *Flowers* yellow, $\frac{5}{8}$ inch across, the lowest shortly pedicelled, the rest sessile. *Sepals* green, spreading in bud ; obtuse, linear and terete in upper part ; widening below to a broadish base. *Petals* bright yellow, $1\frac{1}{2}$ times to twice the sepals, lanceolate, acute, keeled, wide-spreading. *Stamens* $\frac{2}{3}$ the petals, filaments yellow, anthers orange. *Scales* very short, whitish. *Carpels* greenish-yellow, erect, becoming red and stellate in fruit. Whole plant turning red in fading.

Flowers July–August. Hardy.

HABITAT.—East Siberia, Northern Manchuria.

A distinct and pleasing little plant, most resembling *S. hybridum*, but with more or less erect stems densely clothed with narrower leaves, and without creeping, barren shoots.

Rare in cultivation. I have received it from the late Canon ELLACOMBE, Messrs. Backhouse of York, and Cunningham Fraser & Co. of Edinburgh, and from Petrograd.

Named in honour of A. T. VON MIDDENDORFF, whose travels in Northern Siberia in 1843–4 first made known many of the plants of that region.

Var. *diffusum* var nov.* (fig. 59, b).

DESCRIPTION.—Stems longer than in the type, more or less decumbent, tending to root at the base. *Leaves* larger, lanceolate to linear-spathulate, 1–2 inches long, by $\frac{1}{4}$ inch broad, sharply toothed in upper part, teeth up to $\frac{1}{8}$ inch deep, inflorescence lax, 2–3 inches across.

39. *Sedum Ellacombianum* Praeger (figs. 54b, 60, 61).

S. Ellacombianum Praeger in *Journ. of Bot.*, 54, 41, 1917.

A distinct species, widely spread in cultivation, but till recently undescribed, having been confused with *Aizoon*, *Selskianum*, *kamtschaticum*, and *hybridum*. It is far removed from the second and fourth of these—*Selskianum* being tall, hairy, narrow-leaved and smaller-flowered, and *hybridum* standing apart from all the rest of the *Aizoon* section in its creeping habit. *S. Ellacombianum* is nearly related to

* *Caulis* quam in typo longior plus-minus decumbens, nonnunquam basi radicans. *Folia* majora, lanceolata vel lineari-spathulata, 2.5–5 cm. longa, 6 mm. lata, in parte superiore acutidentata, dentes ad 3 mm. longi ; inflorescentia laxa, 5–8 cm. lata.



FIG. 60.—*S. Ellacombianum* Praeger.

Aizoon and *kamtschaticum*, combining some of the characters of each of these species.

It resembles *Aizoon* closely in inflorescence, flower, and fruit, the only reliable difference in these features appearing to be that in *Ellacombianum* the fruiting carpel is deeper above owing to a bulging of the inner edge, than in *Aizoon*: in consequence it is more abruptly contracted into the beak, and its upper edge lies almost horizontally, instead of sloping inwards (compare *a*, *b*, fig. 54). It differs from *Aizoon* in the absence of a much-thickened rootstock and tuberous Telephium-like roots, in its light-green colour, in its numerous arching stems (not tall and erect), and its spatulate crenate-serrate leaves (not lanceolate or ovate-lanceolate sharply serrate) (fig. 61).

It resembles *S. kamtschaticum* in its rootstock much branched upwards, forming a tangle above the surface of the ground, the new stems arising from the lower part of the old ones (not direct from the thickened

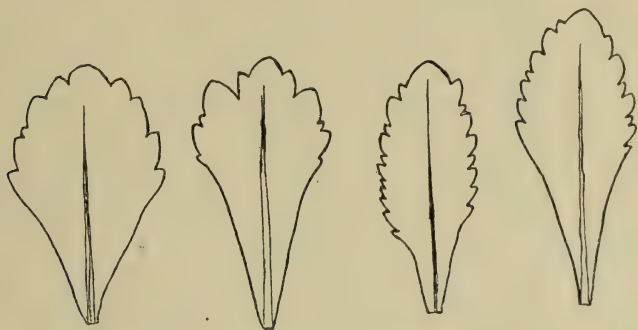


FIG. 61.—Leaves of *S. Ellacombianum*. $\times 1$.

rootstock as in *Aizoon*), and prolonged downwards into strong branching tap-roots bearing dense tufts of short fibrous rootlets. It differs from *kamtschaticum* in its stems never branched, light (not dark) green in colour, broader crenate (not serrate) leaves, dense inflorescence, smaller flowers ($\frac{5}{8}$ inch instead of $\frac{3}{4}$ inch diameter), sepals $\frac{1}{2}$ (instead of $\frac{1}{3}$) the length of the petals, and absence of red coloration in flower or fruit.

DESCRIPTION.—A smooth herbaceous perennial, forming a compact more or less hemispherical tuft about 6 inches high. *Rootstock* much branched upwards, ultimate branches slender, prolonged downwards into one or more thick tap-roots much branched below, and bearing tufts of rootlets. *Stems* annual, arising in spring, all flowering, numerous, unbranched, spreading, 4–6 inches long, smooth, round, reddish below. *Leaves* opposite, rather crowded, $1\frac{1}{2}$ inch long by $\frac{3}{4}$ inch broad, flat, fleshy, bright fresh green, rather paler on back, obovate to spatulate, tapering below to a very short petiole, crenate-serrate above with 4–6 teeth on either side and a large rounded terminal tooth. *Inflorescence* compact, leafy, flat, umbellate, about $1\frac{1}{2}$ inches across, of 3 to 5 branches with a flower in the centre; branches forked with a flower in the forks; each flower subtended by a bract, the lower ones leaf-like, the uppermost linear and very small. *Buds* ovate, acute. *Flowers* generally clear yellow, without admixture of orange or red, $\frac{5}{8}$ inch across, lower ones shortly stalked, upper sessile. *Sepals* green, blunt, linear and terete in upper $\frac{2}{3}$, lower part broadening considerably. *Petals* bright yellow, wide-spreading, lanceolate, acute, keeled, twice the sepals. *Stamens* spreading, yellow, slightly shorter than the petals, the epipetalous ones nearly free, anthers often tinged reddish. *Scales* whitish, about as long as broad.

Carpels erect, yellow, equalling the stamens, narrowed rather abruptly into the long slender styles, wide-spreading in fruit, when they are green or red.

Flowers July–August. Hardy.

HABITAT.—Japan.

This species is very poorly represented in herbaria. The only information I have been able to glean as to its habitat is derived from a specimen (the only representative of the species in the British Museum) from HANCE'S Herbarium, collected as *kamtschaticum* at Hakodate, Japan, by MAXIMOWICZ in 1861; so that the plant belongs to N.E. Asia, as would be expected from its affinities. To judge from its wide distribution in gardens it is evidently long in cultivation. I have seen it in, or received it from, England, Scotland, Ireland, France, Germany, Sweden, Russia, Japan, and Canada, under the names of *Aizoon*, *Selskianum*, *hybridum*, *kamtschaticum*, *spurium*, *serotinum*, etc. Plants from all these countries—from some twenty different sources in all—have been grown in my garden. They show that the plant is remarkably constant in character, though belonging to a group, several species of which display much variation. The only divergence from the type that I have observed is in a plant at Glasnevin, in which the flower-branches are longer, making the inflorescence larger and laxer—3 to 4 inches across.

The only specimen in the Kew Herbarium is labelled "Sedum —, Kew Gardens, Sept. 18, 1901. Legit N. E. Brown," which shows that that botanist, who paid much attention to the Kew Sedums, had noticed its peculiar characters.

Dedicated to the memory of Canon H. N. ELLACOMBE, who first urged me to undertake a revision of the cultivated Sedums.

40. *Sedum kamtschaticum* Fisch. and Meyer (figs. 54c, 62).

S. kamtschaticum Fischer and Meyer, "Index Seminum Hort. Petropol.," 7, 54, 1841. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 145, 1883. Masters in *Gard. Chron.*, 1878, ii. 463.

SYNONYMS.—*S. Brownii* (or *Braunii*) and *S. Lehmanni* (all *nomina nuda*) of some gardens.

ILLUSTRATION.—Wooster, "Alpine Plants," 2, pl. 22, 1874.

A handsome plant, with dark-green foliage and large orange flowers; often confused with some of its allies of the *Aizoon* section, but easily distinguished. From *S. hybridum*, which it most resembles in general appearance, it is separated by the absence of barren stems and of creeping habit, laxer inflorescence, larger flowers, sepals broadening below (not linear), and stellate (not semi-erect) fruit. *S. Middendorffianum* differs in its unbranched stems, narrower leaves, denser inflorescence, and smaller flowers; *S. Ellacombianum* in its light-green colour, broader leaves, unbranched stems, denser inflorescence, and smaller flowers; *S. floriferum* in its linear sepals, smaller flowers, etc.

DESCRIPTION.—A glabrous perennial without barren shoots. *Rootstock* thick and woody, much branched upward, branches twiggy. *Stems* arising in



FIG. 62.—*S. kamtschaticum* Fisch. and Meyer.

late summer from near the base of the flowering stems, remaining short and leafy throughout the winter, shooting up, flowering, and dying in the following season; ascending, 6-9 inches long, round, unbranched at first, but producing axillary flowering branches when the main stem has flowered. *Leaves* alternate or opposite, sessile, $1\frac{1}{2}$ to 2 inches long, obovate to spatulate, toothed in upper third, entire and tapering in lower two-thirds, dark green, shining, margin minutely papillose. *Inflorescence* of lax terminal umbellate cymes, bracts small, lanceolate, entire. *Buds* ovoid, acute, with orange ribs. Flowers orange-yellow, $\frac{3}{4}$ inch across. *Sepals* green, broad below, narrowed half way up to a linear blunt end. *Petals* orange-yellow, lanceolate, apiculate, keeled, twice the sepals or rather more. *Stamens* nearly as long as the petals, filaments yellow, anthers orange. *Scales* whitish, broader than long. *Carpels* yellow, slightly exceeding the stamens, erect in flower, wide-spreading in fruit, changing as the flower fades through orange and crimson to brown.

Flowers June to September. Hardy.

HABITAT.—North-eastern Asia, as far south as Corea and Central China.

Common in cultivation, and generally correctly named. Much more constant in character than most of the section, and little excuse exists for its sale under such names as *Brownii*, *Braunii*, *Lehmanni*, *lividum*, *Maximowiczii*, *pallidum*, and *portulacoides*. Its name *kamtschaticum* commemorates the region from which it was first described.

f. *variegatum*.

With a broad irregular marginal band of white on the leaves. A handsome rock-garden plant, the variegated foliage combined with the orange flowers producing a showy effect.

41. ***Sedum floriferum*** Praeger (figs. 54d, 63, 64).

S. floriferum Praeger in *Journ. of Bot.*, 56, 149, 1918.

Allied to *S. kamtschaticum* and *S. hybridum*, and in many respects intermediate. It shows close affinity to the latter in its sepals, which are linear or oblanceolate, not wide at the base as in most of the section, and in the size and appearance of its flowers; its leaves also are nearest to those of *hybridum*. But instead of being evergreen with perennial creeping stems as in that species, it has the growth-form of *kamtschaticum*, the stems arising in autumn, remaining short during the winter (fig. 63, a), and flowering and dying in the following season; the carpels also are those of *kamtschaticum*, though one-third smaller, as in *hybridum*. From both *hybridum* and *kamtschaticum* it differs in the tendency of its stems to produce many short axillary floriferous branches, which give the plant a bushy and very distinct appearance.

DESCRIPTION.—A glabrous sub-evergreen perennial. *Rootstock* woody, knotted, roots thickened. *Stems* many, annual, arising in autumn, ascending or decumbent, red, somewhat scabrid, about 6 inches long, leafy, branched in upper half or two-thirds, branches axillary, leafy, short, wide-spreading, often numerous, bearing cymes similar to the terminal one. *Leaves* sessile, spatulate-oblanceolate, dark green, up to $1\frac{1}{2}$ inch long by $\frac{3}{8}$ broad, tapered and entire below, toothed in upper third, crowded, blunt; those of the branches similar but much smaller. *Inflorescence* of terminal and lateral flattish, rather dense cymes 1-2 inches across, each usually of three forked branches with flowers in the

forks, lower bracts resembling the leaves, upper ones small entire. Buds ovate-lanceolate, bluntly pointed, ribbed. Flowers $\frac{1}{2}$ inch across, yellow, the lowest



FIG. 63.—*S. floriferum* Praeger.

shortly stalked, rest sessile. Sepals green, unequal, wide-spreading, very fleshy, linear to oblanceolate, blunt, separate almost to the base. Petals yellow, wide-

spreading, lanceolate, acute, twice the sepals, with a short mucro behind the tip. *Stamens* slightly shorter than the petals, spreading, filaments greenish, anthers reddish-yellow, the epipetalous ones attached $\frac{1}{3}$ way up to the petals. *Scales* small, quadrate, entire, greenish, translucent. *Carpels* erect at first, later spreading, greenish-yellow, equalling or shorter than the stamens, slender, compressed laterally; styles long, slender, erect, capitate.

Flowers late July and early August, after *S. kamtschaticum* and before *S. hybridum*. Hardy.

The stems begin their axillary branching as early as May, whereas in *kamtschaticum*, if branches are produced, they mostly arise subsequent to the primary flowering in June, and proceed from the lower, not the upper, leaf-axils. In strong plants of *S. floriferum* the axillary branches may be as many as twenty in number; in less strong plants



FIG. 64.—Immature shoot of *S. floriferum*. $\times 1$.

they are often sub-umbellate, being grouped round the apex of the stem; in weak plants they may be absent (fig. 64). The flowers have the size and rather greenish-yellow colour of those of *hybridum*, not the golden-yellow and large size of *kamtschaticum*. The plant comes true from seed.

The peculiar branching of the stem which is characteristic of this species is also found, to a less extent, in *S. Yabeanum* Makino, a recently published Japanese species of the Aizoon section, not in cultivation, which is described as having "stems often provided with a few sterile branches at the middle portion." (*Bot. Mag.*, Tokyo, 17, 10.)

HABITAT.—N.E. China. Seed was sent by Mr. LIARDET from Weihai-Wei in 1911, to Kew, where the plant has been grown since without a name.

To this species may be referred a curious specimen in the British Museum. It is labelled "Chifu. aest. 1872 (F. B. Forbes)," and is

from HANCE's herbarium. It has a straight fasciate stem and numerous axillary branches, some of which bear flowers. The stem is more scabrid than in the living plant, but otherwise the specimen agrees satisfactorily with *S. floriferum*. Chifu lies only fifty miles from Wei-hai-Wei.

Named from the abundance of its flowers.

42. *Sedum hybridum* Linn. (figs. 54e, 65).

S. hybridum Linn., "Species Plantarum," 431, 1753. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 147, 1883. Masters in *Gard. Chron.*, 1878, ii. 463.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 64. *Nov. Comm. Soc. Scient., Göttingen*, 6, tab. 5, 1776.

Among the broad-leaved, yellow-flowered, hardy Sedums this variable species may be always recognized by its numerous barren stems and creeping habit. Its linear sepals also separate it from all its allies except *S. floriferum*. Its style of growth recalls the pink-flowered *S. spurium* rather than any of the Aizoon group, but, unlike that species, it possesses the thick woody rootstock which is characteristic of its section. It varies considerably in size; in colour (from light green to dark green flushed with red); in size of flower (from $\frac{5}{8}$ inch to $\frac{7}{8}$ inch in diameter), the largest-flowered forms having very broad sepals ($\frac{1}{8}$ inch wide) and petals ($\frac{3}{16}$ inch wide) and broad leaves (see fig. 65, upper half); and in shape of leaf, the width ranging from one-fourth to three-fourths of the breadth. The narrow-leaved forms closely resemble the broad-leaved form of *S. Middendorffianum*, but the creeping habit, linear sepals, &c., distinguish the former. The average plant most resembles *S. kamtschaticum*, but in addition to the characters of habit, sepals, and fruit already mentioned, its unbranched flower-stems and smaller leaves and flowers give it a different appearance; the orange and red tints which so frequently adorn *kamtschaticum* are absent, and instead a greenish hue pervades the buds and fading flowers, and the fruit is green.

DESCRIPTION.—An evergreen perennial, forming a loose mat, with barren and flowering shoots. *Rootstock* becoming thick and woody. *Stems* creeping and branching, round, bare; branches ascending, leafy, about 6 inches long. *Leaves* alternate, glabrous, about 1 inch long by $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, oblanceolate to spatulate, coarsely toothed in upper half, entire and tapering in lower half, scarcely stalked, green, teeth often tipped red. *Inflorescence* a terminal, much branched, leafy, umbellate, flattish cyme about 2 inches across; bracts resembling the leaves, uppermost very small, entire. *Flowers* yellow, $\frac{1}{2}$ inch across. *Buds* oblong, pointed, with greenish ribs and spreading sepals. *Sepals* green, unequal, linear to oblong, subterete, distant, blunt, persistent in fruit, calyx-tube very short. *Petals* yellow, twice the sepals, wide-spreading, lanceolate, concave, with a short mucro behind the hooded tip. *Stamens* $\frac{3}{4}$ the petals, filaments yellow, anthers orange. *Scales* small, whitish. *Carpels* greenish-yellow, with long subulate styles, compressed, green or red, erect in flower and semi-erect in fruit, connate only at the very base.

Flowers sparingly in May, more abundantly in August and September. Hardy.



FIG. 65.—*S. hybridum* Linn.

HABITAT.—East and Central Siberia ; Mongolia.

It is unusual among Sedums in having a double flowering period ; the spring bloom is borne by a few of the strongest shoots of the autumn, and a more abundant bloom appears in late summer. Described as being scabrous, but this character is not apparent in my plants to any appreciable degree.

Frequent in cultivation, but often under erroneous names, such as *Aizoon* and *dentatum*. The name chosen by LINNÆUS for the species conveys the false impression that it is a hybrid.

SECTION VI.—MEXICANA.

MEXICANA (*sectio nova*).

Perennial. Roots fibrous. Rootstock thickening horizontally, or contracted. Stems tufted, erect (at least at first), usually biennial, dying to the root after flowering, the succeeding set usually arising while the preceding set is flowering, so that the plants are evergreen. Flowers hermaphrodite, 5-parted, mostly white, very rarely red or yellow.

Tender Mexican plants.

Series I. SEDASTRUM Rose (*pro genere*).

Stems (6–12 inches high) arising from Sempervivum-like basal rosettes of leaves, which may continue for a year or more before they shoot up to flower. Carpels hollowed behind the scales.

A rather distinct group of soft, fleshy, often downy, Mexican plants, which Rose has considered sufficiently distinct to form a genus, but the only feature which they possess not found in any other Sedums is the peculiar depression in the lower part of the outer face of the carpel, into which the hypogonous scale is pressed. A somewhat similar hollowing out to receive the scales is found in the *petals* of *S. indicum* Hamet.

glabrum nov. comb.

ebracteatum Moç. and Sessé.

pachucense nov. comb.

rubricaula nov. comb.

Hemseleanum Rose.

chapalense S. Watson.

43. *Sedum glabrum* nov. comb. (fig. 66).

SYNONYM.—*Sedastrum glabrum* Rose in "N. Amer. Flora," 22, 58, 1905.

A well-marked member of the *Sedastrum* group, differing from all the rest in being completely glabrous throughout. The red markings on its white petals are also characteristic, and very rare in the genus *Sedum*.

DESCRIPTION.—Totally glabrous, pale green, very fleshy. Rootstock soft, very fleshy, spreading horizontally. Barren stems extremely short. Flowering stems erect, round, smooth, leafy, about 8 inches long (Rose). Leaves alternate, those of barren stems forming a lax rosette, oblong-obovate (ovate—Rose), not narrowed at base, obtusely pointed at apex, flat or concave on face, much rounded on back, $1\frac{1}{4}$ inch long, nearly $\frac{1}{2}$ inch broad, $\frac{1}{4}$ inch thick ; those of the

flower-stems similar but smaller. *Inflorescence* terminal, slightly branched, few-flowered, with small leaf-like bracts below the sessile flowers. *Flowers* flattish, $\frac{3}{8}$ inch across. *Sepals* unequal, ovate, blunt, very fleshy, $\frac{1}{3}$ to $\frac{1}{2}$ the petals, pale green. *Petals* broadly ovate, obtuse, patent above, wavy, white with a purple midrib and a cluster of vein-like purple markings on either side of it, $\frac{1}{4}$ way up from the base. *Stamens* equalling the petals, adnate in the lower third, filaments



FIG. 66.—*S. glabrum* nov. comb.

greenish, anthers reddish. *Scales* minute, ovate, greenish, set in a slight hollow in the carpels. *Carpels* stout, ovate, strongly mammillate, streaked and dotted with purple, at first erect, later slightly spreading, tapering into short, straight, erect styles.

Flowers August. Not hardy.

HABITAT.—Saltillo, Mexico.

Received from Washington. The plant as figured here was not yet fully grown.

44. *Sedum pachucense* nov. comb. (fig. 67).

SYNONYM.—*Sedastrum pachucense* C. H. Thompson in *Trans. Acad. Sciences, St. Louis*, 20, 21–22, pl. X., 1911.

ILLUSTRATION.—*l.c.* (photo.).

A well-marked *Sedastrum*, with dense, small *Sempervivum*-like leaf-rosettes and tallish few-flowered stems. It comes very near

S. Hemsleanum Rose, but its rosette-leaves are long, oblanceolate to spatulate (not orbicular), and its stem-leaves linear-oblong and

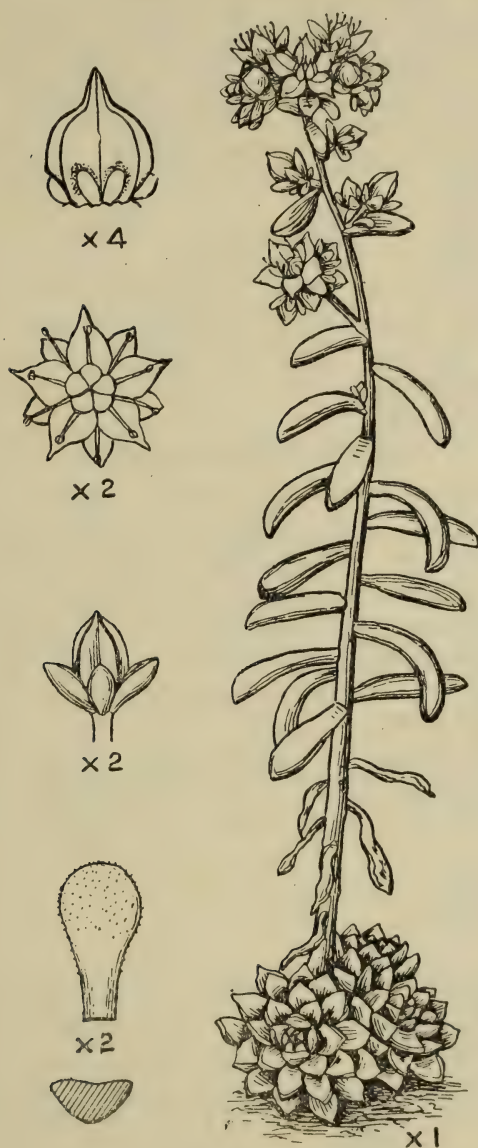


FIG. 67.—*S. pachucense* nov. comb.

glabrous (not linear or lanceolate, puberulent), sepals lanceolate (not broadly ovate), styles short (not long, slender).

DESCRIPTION.—A very fleshy, evergreen perennial. *Barren stems* extremely short, bearing *Sempervivum*-like leaf rosettes. *Flowering stems* fleshy, weak, smooth, green with short longitudinal purple lines, 6–8 inches long. *Leaves* of rosettes alternate, sessile, oblong-spathulate, rather acute, flattish on face, rounded below, very fleshy, bright green, hairy chiefly on the edges, $\frac{1}{2}$ –1 inch

long; leaves of flowering branches sessile, linear-oblong, blunt, reflexed, almost smooth, shining, $\frac{3}{4}$ inch long. *Inflorescence* lax, of a terminal, and short lateral cymes. *Flowers* nearly sessile, white, $\frac{3}{4}$ inch across. *Buds* ovate, blunt, with strong green ribs. *Sepals* leaf-like, very fleshy, blunt or bluntly apiculate, lanceolate, slightly unequal, wide-spreading. *Petals* ovate, acute, wide-spreading, $\frac{1}{2}$ longer than the sepals, slightly greenish white, furrowed down the middle. *Stamens* erect, nearly equalling the petals, the epipetalous ones attached near the base, filaments white, anthers pale purple. *Scales* yellow, linear, twice as long as broad, curved upwards, set in a shallow oval dark-green hollow of the carpel with a raised lip, giving the appearance of an oval dark-green scale with a yellow median portion. *Carpels* papillose, turgid, very erect, slightly spreading later, shorter than the stamens, green, sometimes dotted purple on the edges, styles erect, very short.

Flowers January. Not hardy.

HABITAT.—Mexico: Pachuca, Hidalgo, and apparently elsewhere.

Plants kindly sent me by Dr. Rose, labelled as *S. Hemsleanum* Rose, collected in Mexico by C. A. Purpus in 1905, clearly belong to the recently described *S. pachucense*; at that time the two species had not been separated.

45. *Sedum Hemsleanum* Rose.

S. Hemsleanum Rose in *Bull. New York Bot. Gard.* **3**, 41, 1903.

SYNONYM.—*Sedastrum Hemsleyanum* Rose in "N. Amer. Flora," **22**, 58, 1905.

ILLUSTRATION.—*Trans. Acad. Sci. St. Louis*, **20**, pl. 11, 1911 (photo).

Very near the last species, under which the differences between the two are indicated. As mentioned under *S. pachucense*, plants received from Washington as *Hemsleanum* proved to belong to the former species; but according to Thomson (*l.c.*) both species are in cultivation at St. Louis.

DESCRIPTION.—"Perennial, caulescent, 1–3 dm. high, branching, puberulent. *Inflorescence* an elongated panicle; flowers sessile, arranged along one side of the axes; calyx-lobes broadly ovate, obtuse, 1.5 mm. long; petals white, 4 mm. long, ovate, acuminate; carpels 5, tipped with long, slender styles."—Rose, *loc. cit.*

Flowers winter. Not hardy.

HABITAT.—Mexico.

46. *Sedum ebracteatum* Moç. and Sessé (fig. 68).

S. ebracteatum Moç. and Sessé ex De Candolle "Mémoire Crassul.," **37**, 1828; Hemsley, "Biol. Centr. Amer.," **1**, 394.

SYNONYM.—*Sedastrum ebracteatum* Rose in "N. Amer. Flora," **22**, 59.

ILLUSTRATION.—De Candolle, *l.c.*, pl. 6, B. Saunders' "Refug. Botan.," pl. 221.

The most familiar member of the *Sedastrum* group, which Dr. Rose raises to the rank of a genus, and which is characterized by its basal dense leaf-rosettes, flowering-branches dying back to the base after flowering, and ovate carpels hollowed behind the scales. The present species is a lax, weak, tall, fleshy plant, with very pubescent stems and pubescent very broad leaves. It comes nearest *S. rubri-caule* Rose, which is stated to differ in its much less pubescent and purplish (not green or only slightly purplish) stem, &c. (but plants

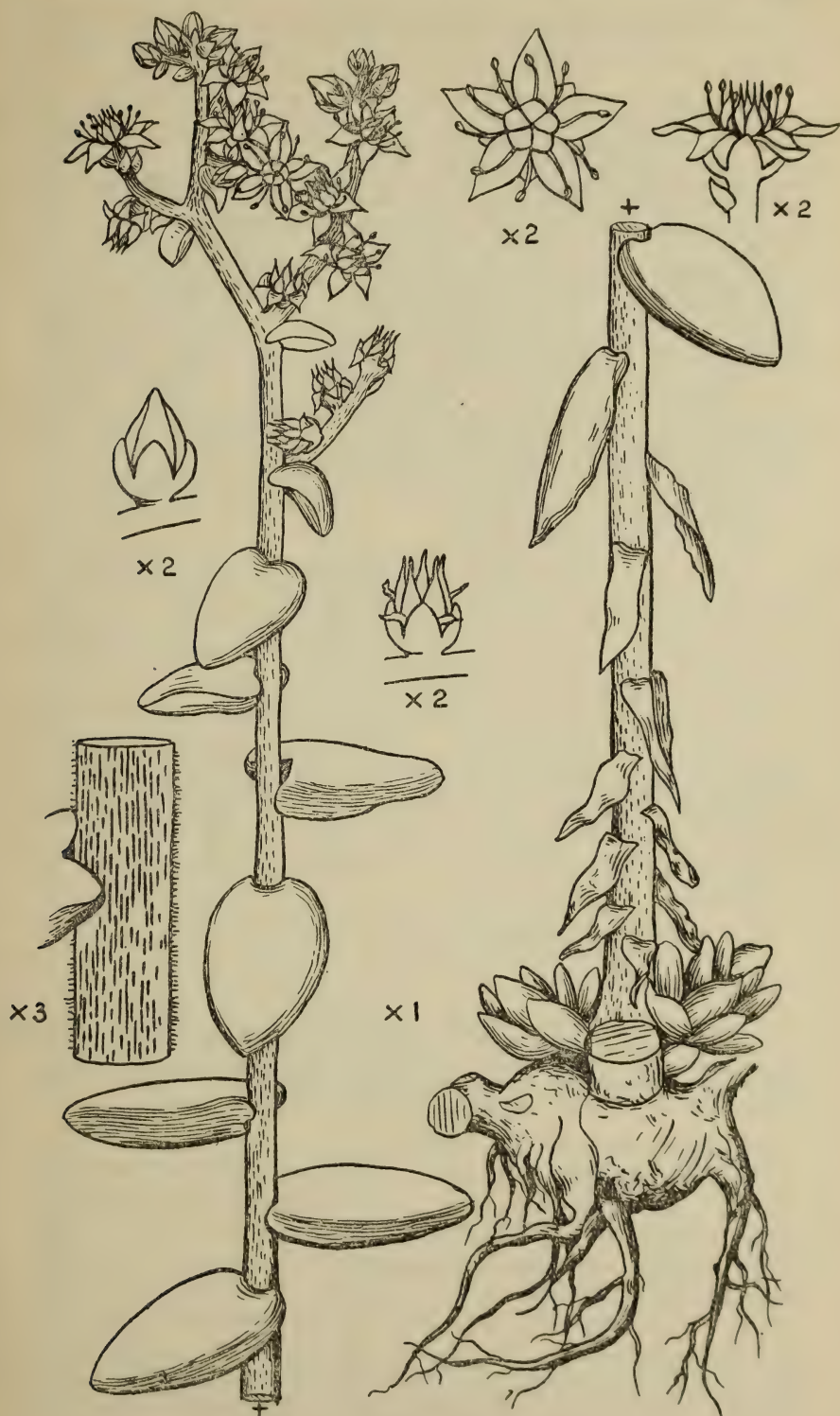


FIG. 68.—*S. ebracteatum* Moq. and Sessé.

sent to Kew from Washington named *rubricaula* were indistinguishable in flower from *ebracteatum*).

DESCRIPTION.—A bright green, fleshy, soft, downy perennial, forming basal rosettes which shoot up, flower, and die in the following season. *Rootstock* horizontal, very fleshy, greenish, knotted with the round, flat scars of former stems above, bearing shortish, fleshy roots below. *Stems* of the barren shoots extremely short, bearing a loose rosette of leaves an inch across; those of the flowering shoots a foot high, erect, stout, round, finely hairy, unbranched, green, or marked especially above with many short purple longitudinal lines, leafy. *Leaves* alternate, soft, very fleshy, downy on both sides, ovate, very broad at base, bluntly pointed at apex, flat on face, rounded on back, bright green; those of the barren shoots crowded in a rosette, those of the flowering shoots patent or deflexed, clasping, exceeding the internodes, an inch long. *Inflorescence* terminal, very lax, 2–3 inches long and broad, of 3 to 5 alternate axillary few-flowered almost bractless branches. *Flowers* sessile, whitish, $\frac{1}{2}$ inch across. *Buds* ovate, very blunt. *Sepals* equal or nearly so, downy, very fleshy, ovate, divided half way down, rather acute, wide-spreading, more or less dotted with purple. *Petals* white with a greenish nerve, ovate, acute, patent, twice the sepals. *Stamens* erect, nearly equalling the petals, filaments white, anthers yellow. *Scales* ovate, blunt, fleshy, greenish, translucent. *Carpels* stout, erect, equalling the stamens, hollowed out behind the scales, styles short, whitish.

Flowers October. Not hardy.

HABITAT.—Hidalgo, Mexico.

Long in cultivation, though very rarely seen. Saunders figured it in 1871 from specimens in his glass-houses, and gave plants to Kew. I owe my plant to the kindness of Dr. Rose and of the Director at Kew, where the species is still in cultivation; received also from La Mortola, and seen in the Botanic Garden at Dresden.

In "North American Flora" (*loc. cit.*) the sepals are described as "very unequal and leaf-like." This character is not mentioned or shown in the descriptions or figures of De Candolle, Hemsley, or "Refugium Botanicum," and in the living and dried specimens which I have examined the sepals are small, ovate, and regular.

The name refers to the poor development of bracts on the inflorescence.

47. *Sedum rubricaula* nov. comb.

Sedastrum rubricaula Rose in "N. Amer. Flora," 22, 59, 1905.

DESCRIPTION.—"Stems about 30 cm. high, somewhat pubescent, greenish below, purplish above. Basal rosettes dense; leaves ovate, thick, rather obtuse; stem-leaves acutish, bright green; flowers on ultimate branches 3 or 4, sessile; calyx green, cleft to near the middle; petals broadly ovate, white; stamens erect; anthers yellowish; carpels erect."—Rose, *loc. cit.*

HABITAT.—Mexico. Not hardy.

Described by ROSE from specimens which flowered in Washington in 1903. I do not know the plant; specimens sent to Kew from Washington which flowered in 1917 proved indistinguishable from *S. ebracteatum*, and there is little in the description to separate it from that species. The stems of *rubricaula* are stated to be more hairy and more suffused with purple than in its ally, and the leaves ovate instead of obovate or spatulate; but according to the original description the leaves of *S. ebracteatum* are ovate, and HEMSLEY describes them as oval-oblong. So far as I have had an opportunity of studying

S. ebracteatum, it varies as regards hairiness and colour of stem and shape of leaf sufficiently to include *S. rubricaule*.

The name refers to the red colour of the stems.

48. *Sedum chapalense* S. Watson.

S. chapalense S. Watson, *Proc. Amer. Acad.*, **22**, 411, 1887.

SYNONYM.—*Sedastrum chapalense* Rose in "N. Amer. Flora," **22**, 59, 1905.

Distinguished from the other *Sedastrums* in cultivation by its small size (about 4 inches high), glabrous stems (though the leaves are slightly pubescent), and thin stem-leaves. Plants sent from Washington by Dr. Rose unfortunately died before flowering, so I have not had an opportunity of studying the plant.

DESCRIPTION.—*Stems* stout, about 4 inches high, much branched above, glabrous, yellowish-green. *Leaves* slightly pubescent, those of the barren shoots rosulate, obovate, or ovate, rather acute, $\frac{1}{2}$ inch long, stem-leaves rather thin. *Flowers* sessile, arranged along one side of the branches, 5-parted. *Calyx* slightly pubescent, lobes unequal, oblong-ovate, rather acute. *Petals* oblong-ovate, acute, $\frac{1}{2}$ inch long, white. *Stamens* 10. *Scales* small. *Carpels* equalling the petals.

HABITAT.—Mexico. Not hardy.

The above description is taken from those of S. Watson and Rose (*loc. cit.*).

Named after the type locality, Chapala.

Series II. ALAMOSANA.

Small (3–6 inches high). Leaf-rosettes absent, or small and lax. Stems annual or lasting up to eighteen months. Carpels not hollowed behind the scales.

alamosanum S. Watson.

lenophylloides Rose.

mellitulum Rose.

bellum Rose.

Cockerellii Britton.

versadense Thompson.

Wrightii A. Gray.

diversifolium Rose.

potosinum Rose.

49. *Sedum alamosanum* S. Watson (fig. 69).

S. alamosanum S. Watson in *Proc. Amer. Acad.*, **25**, 148, 1890.
"N. Amer. Flora," **22**, 62, 1905.

A handsome little Mexican species, near to *S. mellitulum*, with which it has been confounded. The very dense-leaved glaucous young shoots, few-flowered inflorescence, bright-red buds, reddish-white flowers, and early vernal blooming, sufficiently distinguish it from *S. mellitulum*, which is laxer and greener in growth, with longer leaves, a compact, flattish inflorescence, greenish-white buds, and quite white flowers which open in autumn.

DESCRIPTION.—A small glaucous perennial. *Stems* tufted, erect, afterwards diffuse, often slightly branched, 3–5 inches long. *Leaves* crowded, $\frac{1}{4}$ inch long, linear-oblong, blunt, ascending, very glaucous, ultimately reddish, covered, save

on face, with minute pimples. *Cymes* terminal, small, few-flowered. *Buds* bright red. *Flowers* $\frac{3}{4}$ inch across, shorter than the pedicels. *Sepals* spreading,

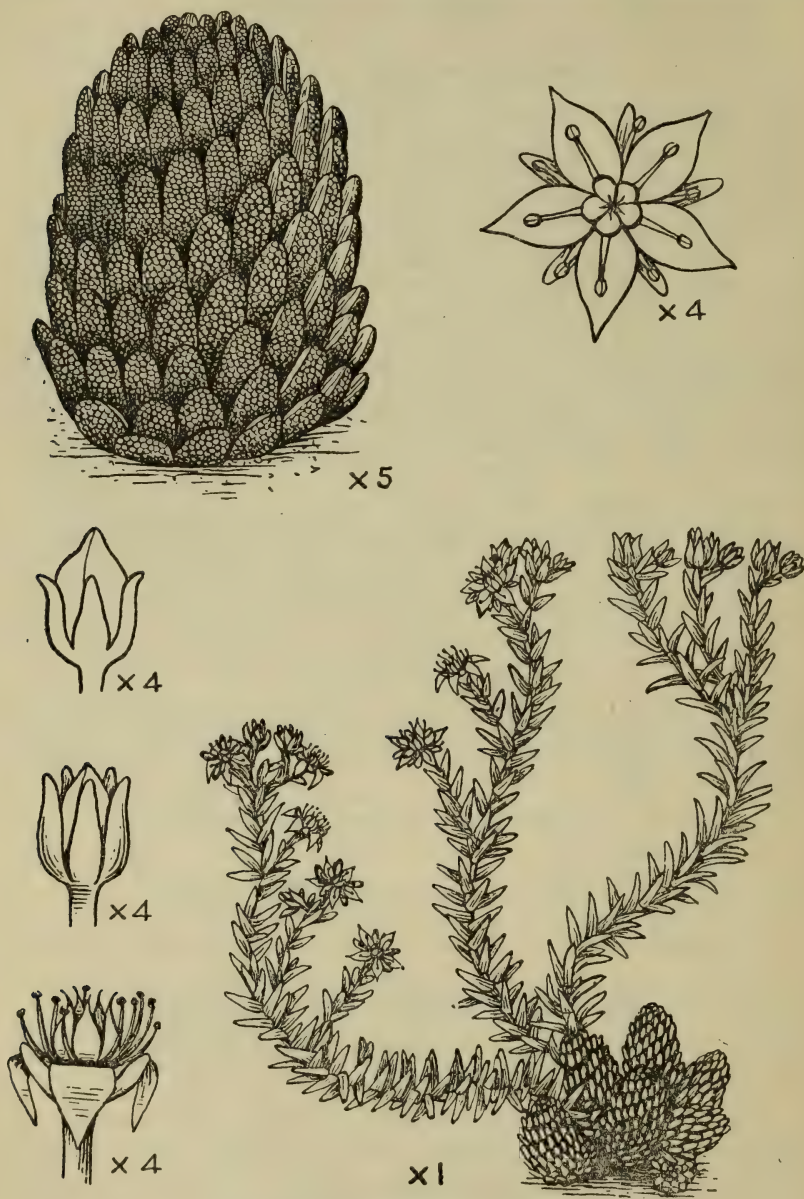


FIG. 69.—*S. alamosanum* S. Watson.

lanceolate, blunt, papillose like the leaves, very fleshy, equalling the petals. *Petals* broadly lanceolate or elliptic, acute, wide-spreading, ultimately sharply reflexed in upper half, reddish-white with a silvery sheen. *Stamens* $\frac{3}{4}$ the petals, spreading, filaments white, anthers purple. *Scales* rather large, thrice as long as broad, whitish, linear, truncate, emarginate. *Carpels* short, reddish-white, erect.

Flowers February-March (gentle heat), March-April (cold frame).
Not hardy.

HABITAT.—Mountains of North-Western Mexico.

The stems of *alamosanum* arise in autumn or winter, grow erect and unbranched till the following autumn, when they become straggling and branch slightly at various points, each branch bearing in the following spring a few flowers at its summit; the stems die after flowering. In these respects they are closely paralleled by those of the green-leaved and yellow-flowered *S. diversifolium*. The corolla, when fully expanded, is flat, and with the equally long and similarly coloured calyx, gives the effect of a ten-petalled pale-reddish flower.

Received from the Botanic Gardens of Washington and New York, also from the Edinburgh and Cambridge gardens in Great Britain.

Named after the Alamos Mountains, Sonora, Mexico, where it was first collected.

50. *Sedum mellitulum* Rose (fig. 70).

S. mellitulum Rose in *Contrib. U.S. Nat. Herb.*, **13**, 299, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 57 (photo).

A neat little plant, easily known by its tuft of erect stems a few inches high, clothed with linear leaves and terminating in a flattish cyme of white flowers. For some years confused in America with *S. alamosanum*, but that has shorter, more glaucous leaves and few-flowered cymes with bright-red buds and pale-reddish flowers; it flowers, moreover, in early spring, while *S. mellitulum* blooms in autumn.

DESCRIPTION.—A small, slender glabrous tufted perennial, without barren shoots. Stems lengthening in spring from short autumn shoots and dying after fruiting, slender, terete, reddish, rough with minute papillæ, 3-4 inches high, sometimes slightly branched. Leaves alternate, green, ultimately reddish, linear-subulate, blunt, terete, slightly spurred, $\frac{1}{4}$ - $\frac{3}{8}$ inch long, set at right angles to the stem; young leaves glaucous, densely papillose. Inflorescence flattish, 1-2 inches across, of 2-3 wide-spreading simple or forked branches with flowers in the forks. Buds ovate, pointed, ribbed, enclosed and exceeded by the cup-shaped calyx. Flowers nearly $\frac{1}{2}$ inch across; pedicels slender, shorter than the flowers. Sepals green, resembling the leaves, wide-spreading, slightly spurred, separate to the base. Petals clear white, ovate, acute, greenish on back, equalling or slightly exceeding the sepals. Stamens nearly equalling the petals, wide-spreading, filaments white, anthers crimson. Scales short, cuneate, retuse, tipped orange. Carpels white, erect, slightly shorter than the stamens, styles divergent.

Flowers September-October. Not hardy.

HABITAT.—Sierra Madre, Mexico.

A pretty plant, as its name implies (*mellitulus*=little darling). It appears to prefer half shade to full sunlight, and dries up easily.

51. *Sedum Cockerellii* Britton (fig. 71).

S. Cockerellii Britton in *Bulletin New York Bot. Gard.*, **3**, 41, 1903.

"N. Amer. Flora," **22**, 67. Cockerell in *Gard. Chronicle*, 25 Jan. 1919.

A small, pale-green plant, recognizable among the white-flowered Mexican species by its flat, spathulate pointed root-leaves, narrowly lanceolate stem-leaves, linear sepals, and lanceolate petals.

DESCRIPTION.—A small glabrous evergreen perennial. *Roots* fibrous. *Stems* annual, smooth, round, arising in autumn, bearing a small tuft of leaves during the winter. *Flower-stems* erect or ascending, from 2 inches (my plants) to 8 inches (Britton description) high, leafy, simple or branched. *Leaves* alternate, glabrous, flat, fleshy, sessile, shortly spurred; the basal ones spatulate, bluntly pointed, tapered below, $\frac{1}{2}$ inch by $\frac{1}{4}$ inch or more; the upper linear-lanceolate, rather acute, $\frac{1}{2}$ inch by $\frac{1}{3}$ inch (in my plants), $\frac{3}{8}$ inch to 1 inch by $\frac{1}{4}$ inch (Britton).



FIG. 70.—*S. mellitulum* Rose.

Inflorescence a terminal 2-3-branched cyme, 1 inch (to 2 inches) across. *Buds* ovate-lanceolate, ribbed. *Flowers* white, $\frac{1}{2}$ inch across. *Sepals* green, leaf-like, long, linear, rather acute, slightly unequal, slightly spurred, separate nearly to the base. *Petals* wide-spreading in the upper part, narrowly lanceolate (to linear oblanceolate—Britton), acute, a little longer than the sepals, $\frac{1}{4}$ inch long, white, grooved. *Stamens* spreading, slightly shorter than the petals, filaments pink, anthers purple. *Carpels* slender, erect, shorter than the stamens, pink.

Flowers August. Not hardy.

HABITAT.—Mountains of New Mexico.

My specimens, which were received from the Smithsonian Institution, did not grow freely, nor did some of them which were cultivated

at Glasnevin ; the description made from these small plants has been supplemented therefore by notes from the description in "North

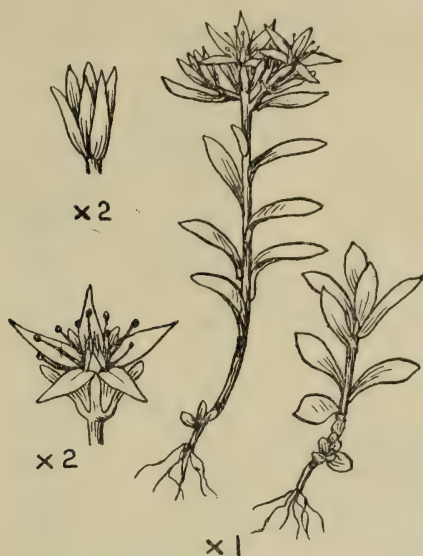


FIG. 71.—*S. Cockerellii* Britton.

American Flora." Some further information is contained in Prof. COCKERELL'S note (*loc. cit.*).

The name is in honour of T. D. A. COCKERELL, the first collector of the plant.

52. *Sedum Wrightii* A. Gray (fig. 72).

S. Wrightii A. Gray, "Plantae Wrightianae," 1, 76, 1852. Rose in "N. Amer. Flora," 22, 72.

A pretty little *Sedum*, not closely resembling any other species in cultivation. Partly on account of the way the little, thick obovate leaves readily drop off and root, a close tuft of tiny bright-green rosettes is formed around the fleshy rootstock, from among which leafy flower-stems rise, often decumbent under their own weight, bearing small white, rather bell-shaped, flowers, the lower part of the petals being erect, the upper part spreading, broad, apiculate, hiding the blunt oblong sepals. The carpels are purple on the inner face.

DESCRIPTION.—A small glabrous evergreen perennial. *Rootstock* fleshy, large, decked during winter with many minute leaf-rosettes, some of which elongate in summer into smooth, round, leafy flowering stems, erect (at least at first), 3-4 inches high (in cultivated plants ; 8-20 inches according to Rose), simple or branched. *Leaves* alternate, crowded, sessile, extremely fleshy, flat above, very convex beneath, obovate to rhomboidal, tapering at base, rounded or bluntly pointed at apex, minutely papillose especially when young, bright green, becoming smaller, narrower, and dotted with red above, about $\frac{3}{8}$ inch long by $\frac{1}{8}$ inch broad at base of flowering stem, half that size on barren shoots and at top of flowering stem. *Inflorescence* terminal, compact, flattish, of 2 or 3 usually simple branches, an inch across. *Buds* oblong-ovate, the corolla almost hidden by the long erect sepals. *Flowers* almost sessile, $\frac{3}{8}$ inch across.

Sepals large, very fleshy, oblong, blunt, rather unequal, green dotted with red, resembling the upper leaves, equalling the erect part of the corolla. *Petals* erect below, wide-spreading above, oblong-ovate, obtuse, apiculate, white, with a greenish keel on upper part of back and a groove on face. *Stamens* shorter than the petals, spreading, filaments white, anthers purple. *Scales* spreading, cuneate,



FIG. 72.—*S. Wrightii* A. Gray.

as broad as long, yellow. *Carpels* white, purple on the inner face, erect, with diverging styles, shorter than the stamens.

Flowers September-October (cold frame). Not hardy.

HABITAT.—South-western North America.

Received from the Smithsonian Institution by the kindness of Dr. ROSE. The plants were collected in Mexico by Dr. PALMER.

Named after CHARLES WRIGHT, the first collector of the plant.

53. *Sedum potosinum* Rose (fig. 73).

S. potosinum Rose in *Contrib. U.S. Nat. Herb.*, 13, 300, 1911.

A distinct, but not very interesting, smallish plant, which may be recognized by its rather creeping habit, pale glaucous-green tint, often with a pinkish flush, blunt, linear, nearly terete leaves, and white flowers. It does not resemble at all closely any other tender *Sedum* in cultivation.

DESCRIPTION.—A smallish, rather weak and brittle, evergreen perennial of a pale glaucous, often pinkish, colour. *Stems* rooting below, ascending, smooth, round, pink, branched, 3-6 inches high. *Leaves* of barren shoots crowded,

ascending, blunt, linear, terete, $\frac{3}{8}$ inch to $\frac{1}{2}$ inch long, pale often pinkish glaucous green, with a short blunt spur; those of the flowering shoots larger, about $\frac{1}{2}$ inch by $\frac{1}{8}$ inch, linear-lanceolate, rather flattened. *Inflorescence* cymose, of 2 or 3 small, lax, leafy scorpioid branches, one of them usually longer than the other two. *Buds* slender, pointed. *Flowers* $\frac{3}{8}$ inch across, sub-sessile. *Sepals* pale-green or pink, fleshy, linear-lanceolate, blunt, separate almost to the

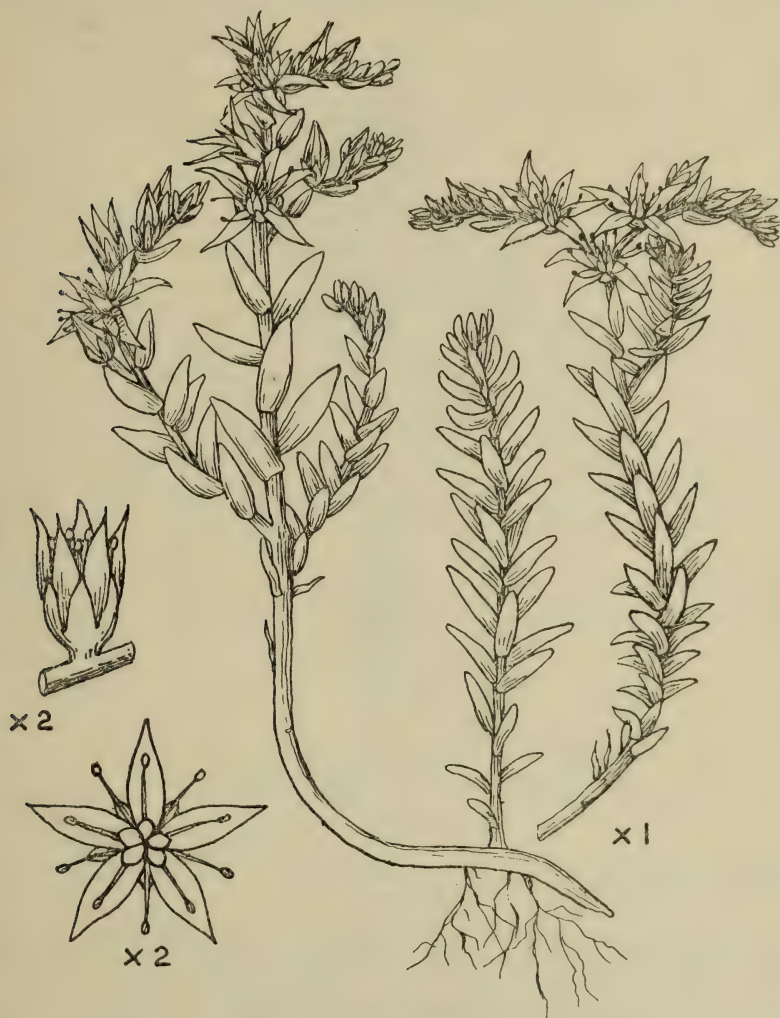


FIG. 73.—*S. potosinum* Rose.

base. *Petals* white, wide-spreading, linear-lanceolate, acute, flushed red on back, twice the sepals. *Stamens* $\frac{3}{4}$ the petals, filaments white, anthers purple. *Scales* small, white. *Carpels* erect, equalling the stamens, white, styles pink.

Flowers July (gentle heat); August (cold frame). Not hardy.

HABITAT.—Mexico.

Received from Washington, New York, and Edinburgh; also from Haage and Schmidt, of Erfurt.

The name is derived from San Luis Potosi, where the plant grows.

54. *Sedum lenophylloides* Rose (fig. 74).

S. lenophylloides Rose in *Contrib. from U.S. Nat. Herb.*, **13**, 298, 1911.

A distinct little Mexican plant, known by its finely scabrid surface, strict erect stems, with broadly lanceolate leaves usually trough-



FIG. 74.—*S. lenophylloides* Rose.

shaped on face, greenish-white petals, and large orange scales. It is not very close to any other species.

DESCRIPTION.—A slightly scabrid perennial. *Rootstock* woody. *Stems* erect, strict, slender, leafy, 2–12 inches high, somewhat branched. *Leaves* patent, rather crowded, alternate at least above, sessile, entire, broadly lanceolate, tapered at base, bluntly pointed at apex, very fleshy, concave or flat on face, much rounded on back, about $\frac{1}{2}$ inch long, $\frac{3}{16}$ inch broad, $\frac{1}{16}$ inch thick, green when young, purple when old. *Inflorescence* a short terminal panicle. *Sepals* ovate, green. *Petals* lanceolate, greenish white. *Stamens* 10. *Scales* large, orange. *Carpels* at first erect, later more or less spreading, styles long, slender.

Flowers September. Not hardy.

HABITAT.—Monterey, Mexico.

My plants have not done well, but the figure conveys an idea of its habit and leaves. The description is completed from Rose's diagnosis.

The name refers to its resemblance, particularly in leaf, to *Lenophyllum*, a small genus of Mexican Crassulaceae.

55. *Sedum bellum* Rose (fig. 75).*S. bellum* Rose MS.

SYNONYM.—*S. farinosum* Rose in *Contrib. U.S. Nat. Herb.*, 13, 297, 1911, pl. 54 (not *S. farinosum* Lowe, *Trans. Cambr. Phil. Soc.*, 4, 31, 1831, and "Fl. Madeira," 1, 325, 1868, which is a Madeiran species allied to *S. album*, and not, I believe, in cultivation).

ILLUSTRATION.—Rose, *loc. cit.* (photo).

A distinct and attractive little plant, not to be confounded with any other Mexican species. The neat, glaucous, spathulate foliage and large inflorescences of white flowers give it a very pleasing appearance.

Sent under the name *S. farinosum* from Washington and New York, and subsequently from the former under the name of *S. bellum*.

DESCRIPTION.—A mealy-glaucous perennial. *Stems* nearly biennial, few, leafy, 3–6 inches, unbranched or slightly branched, arising in spring and flowering in the following spring. *Leaves* sessile, glaucous, entire, spathulate, flat on face, convex on back, covered with minute mealy papillæ when young, set at right angles to the stem, up to 1 inch long, decreasing in size upwards and passing into bracts which continue to the summits of the branches. *Inflorescence* a flattish leafy cyme, large for the size of the plant. *Buds* ovate, rather acute. *Flowers* $\frac{1}{2}$ inch across, shorter than the pedicels. *Sepals* green, fleshy, separate to the base, ovate-lanceolate, bluntish, rather unequal, slightly spurred. *Petals* spreading, white, ovate, acute, slightly wavy, twice the sepals, with a deep median furrow above. *Stamens* spreading, shorter than the petals, filaments white, anthers purple. *Scales* small, yellowish, emarginate. *Carpels* white, spreading, equalling the stamens.

Flowers March–April (gentle heat), May (cold frame). Not hardy.

HABITAT.—San Ramon mining camp, 80 miles west of Durango City, Mexico.

The name refers to its pleasing appearance.

56. *Sedum versadense* Thompson (fig. 76).

S. versadense Thompson in *Trans. Acad. Sci. St. Louis*, 20, 23, 1911.

ILLUSTRATION.—*Loc. cit.* pl. 12 (photo).

A very pretty and distinct evergreen species, easily recognized by its spathulate downy leaves tipped with red at the apex and on the edges, and pale rose-coloured flowers arranged in a terminal cyme of 2 or 3 drooping branches.

DESCRIPTION.—A tufted, downy evergreen perennial, the shoots arising in autumn, growing to a height of 4–6 inches during the following season, and flowering in the spring after that. *Stems* decumbent at the base, ascending, densely hairy, glabrous in upper part, unbranched, leafy. *Leaves* very downy, very fleshy, spathulate-cuneate, slightly spurred, with a deflexed bluntly-pointed apex and slightly raised edges, flattish above, much rounded below, green, flushed red at apex and on edges, up to 1 inch by $\frac{1}{2}$ inch. Upper leaves of flowering shoots smaller, narrower, more distant, subacute, glabrous, merging into obovate acute glabrous bracts, one of which subtends each flower. *Inflorescence* glabrous, of 2–3 drooping secund branches 1–1 $\frac{1}{2}$ inch long. *Buds* rosy, ovate. *Flowers* $\frac{3}{4}$ inch across, the lower ones stalked. *Sepals* unequal, oblong-lanceolate or oblanceolate-apiculate, not spurred, divided almost to the base, ascending, the tips standing up between the petals. *Petals* oblong-lanceolate, white, flushed rose in the upper portion, rose on back, deflexed, keeled, slightly exceeding the sepals. *Stamens* $\frac{1}{2}$ – $\frac{3}{4}$ the petals, filaments white, anthers bright

rose-red, wide-spreading. Scales small, spreading, rounded, almost colourless. Carpels equalling the stamens, white, the short styles slightly spreading.

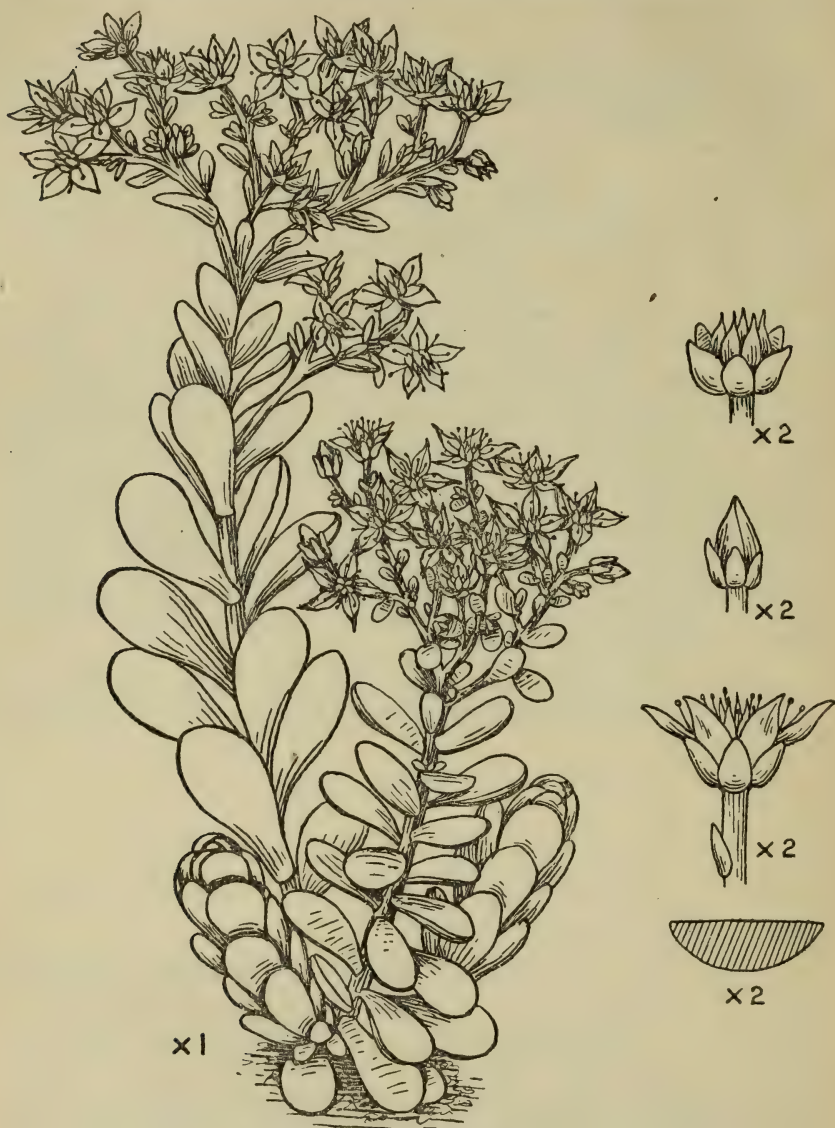


FIG. 75.—*S. bellum* Rose.

Flowers May (gentle heat) ; July–September (cold frame). Very sensitive to frost.

HABITAT.—Versada, Oaxaca, Mexico.

My plants came from the Missouri Botanic Garden (whence it was first described) and from Washington (unnamed), and Edinburgh (unnamed).

The glabrous flowering shoot, a couple of inches in length, arises

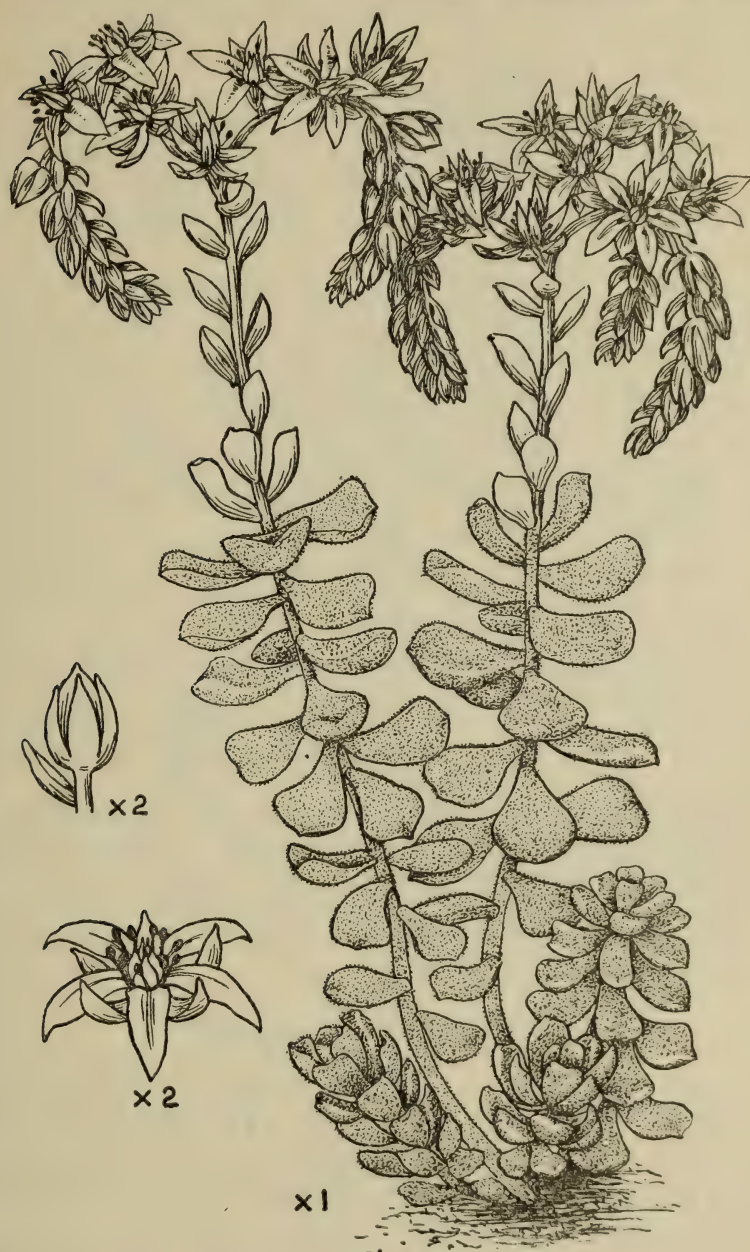


FIG. 76.—*S. versadense* Thompson.

from the summit of the hairy shoot of the previous year, the leaves becoming abruptly small and quite glabrous.

The species takes its name from the locality where it was discovered.

57. *Sedum diversifolium* Rose (fig. 77).

S. diversifolium Rose in *Bulletin New York Bot. Garden*, 3, 44, 1903.
 "N. Amer. Flora," 22, 73.

A delicate, very succulent, fresh green little plant, recognized by its tufted habit, annual stem crowded with shining pellucid leaves very convex on both sides, and few sessile yellow flowers. The leaves fall off very easily and at once form new plants from buds at the point of detachment.

DESCRIPTION.—A glabrous tufted perennial. *Stems* annual, weak, at first erect, unbranched, later decumbent with a few branches, round, smooth, 4-8 inches long. *Leaves* alternate, those of the young shoots densely imbricate, slightly glaucous, flat, fleshy, papillose, obovate, sessile, $\frac{3}{16}$ inch long; those of the flowering shoots caducous, bright green, crowded, patent, $\frac{1}{4}$ - $\frac{1}{2}$ inch long, very fleshy, very convex on both sides, narrower and smaller near summit. *Inflorescence* of a terminal flower with one or two on either side. *Buds* ovate, rather acute. *Flowers* $\frac{3}{8}$ inch across, pedicels short. *Sepals* unequal, ascending, resembling the leaves. *Petals* clear yellow, wide-spreading, broadly lanceolate, acute, twice the sepals. *Stamens* spreading, yellow, $\frac{2}{3}$ the petals. *Scales* whitish, rectangular, longer than broad. *Carpels* yellow, slightly spreading, shorter than the stamens.

Flowers February-March (gentle heat); May (cold frame). Not hardy.

HABITAT.—State of Mexico, Mexico.

In his description of the species, Dr. ROSE says that the flowers are pale yellow, inconspicuous, and solitary. In the plants he sent me, and others received from New York, which have flowered at Glasnevin, they are clear yellow, fairly conspicuous, and usually in threes.

The young shoots arise in winter, before the old ones have flowered, so that the stems have a life of about 18 months; but the specimens observed by Dr. ROSE at Washington and New York bloomed in December. In the young stages they recall those of *S. longipes*.

Named on account of the difference between the young and mature leaves.

SECTION VII.—*SEDA* GENUINA.

Section *SEDA* GENUINA Koch, "Synopsis Deutsch. und Schweiz. Flora," 259, 1836; *EUSEDUM*, Boissier, "Flor. Orientalis," 2, 775.

Perennial. Stems perennial, creeping or erect and sub-shrubby, bearing barren and annual flowering shoots. Flowers hermaphrodite, usually 5- (rarely 4- to 9-) parted. Hardy or tender.

This section contains several well-marked groups of closely related species with a defined geographical range, such as the *Involucrata* (*spurium*, *stoloniferum*, *proponticum*, *Stevenianum*) from the Caucasus region, the *Spathulifolia* (*spathulifolium*, *yosemitense*, *rubroglaucum*, *Hallii*, *oreganum*, *divergens*) from Western North America, the *Rupestria* (*rupestre*, *reflexum*, *altissimum*, *anopetalum*, *stenopetalum*, *pruinatum*, *amplexicaule*) from Europe, with one in America; also a

number of plants, largely European and Mexican, with few or no close allies, displaying a wide range of characters. The most

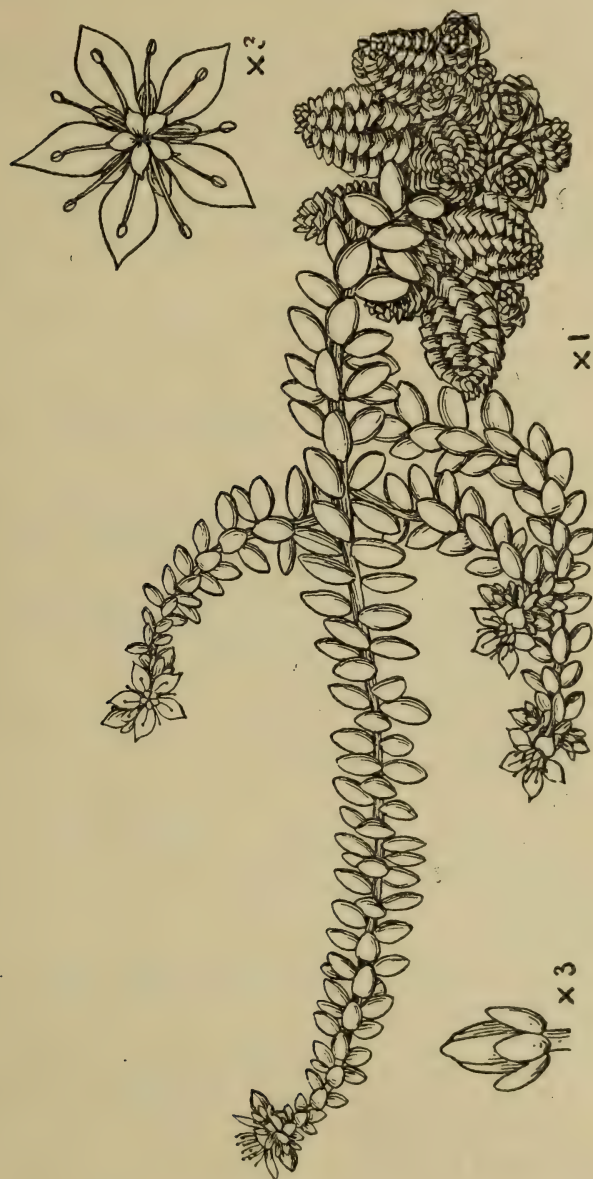


FIG. 77.—*S. diversifolium* Rose.

convenient subdivision of this large and heterogeneous section is founded on flower-colour, growth-form, and leaf-shape.

Among Old World Sedums, *S. populifolium*, with its twiggy, erect growth, differs much from the typical *Seda Genuina*; but in Mexico many species occur of habit linking up *populifolium* with the others, and pointing to its inclusion with them among the *Seda Genuina*.

The anomalies displayed by the Mexican representatives of the section have already been discussed on p. 24. It seems best to widen the definition of KOCH to include the sub-shrubs so characteristic of the Mexican *Sedum*-flora.

Included in the *Seda Genuina* are also the yellow-flowered *Japonica* series of Maximowicz from China and Japan (of which *SS. Celiae* Hamet, *japonicum* Siebold, *lineare* Thunberg, *multicaule* Wallich, *sarmentosum* Bunge, *Chauveaudi* Hamet, *trullipetalum* H. f. and T., *varicolor* Praeger, *Zentaro-Tashiroi* Makino, are in cultivation), the ovoid-leaved *S. nudum* and *S. lancerottense* from the Atlantic Islands, and the peculiar white-flowered *S. Chaneti* from China.

GENERAL ARRANGEMENT OF THE SEDA GENUINA.

A. Flowers white.

(a) Sub-shrubs.

populifolium, *retusum*, *Adolphi*, *frutescens*, *allantoides*, *Bourgaei*, *guadalajaranum*, *griseum*.

(b) Herbs.

(1) Leaves flat : *ternatum*, *Nevii*, *adenotrichum*, *Chaneti*, *alsinefolium*, *magellense*, *monregalense*, *moranense*, *Liebmannianum*, *compactum*.

(2) Leaves terete or sub-terete : *dasyphyllum*, *brevifolium*, *anglicum*, *album*, *gypsicolum*, *hirsutum*, *Lydium*, *gracile*, *Alberti*.

B. Flowers red or purple.

(a) Sub-shrub.

oxypetalum.

(b) Herbs.

(1) Leaves flat : *spurium*, *stoloniferum*, *proponticum*, *Stevenianum*, *rhodocarpum*, *longipes*.

(2) Leaves terete : *pulchellum*.

C. Flowers yellow.

(a) Sub-shrubs.

nutans, *praealtum*, *dendroideum*, *confusum*, *amecamecanum*, *pachyphyllum*, *Treleasei*.

(b) Herbs.

(1) Leaves opposite or whorled : *rubroglaucum*, *divergens*, *Stahlii*, *Zentaro-Tashiroi*, *Chauveaudi*, *sarmentosum*, *lineare*, *mexicanum*.

(2) Leaves alternate.

(i.) Leaves spathulate, flat : *Palmeri*, *compressum*, *varicolor*, *spathulifolium*, *yosemitense*, *Hallii*, *oreganum*.

(ii.) Leaves not broadest above (ovate to linear) : *humifusum*, *cupressoides*, *acre*, *Stribnyi*, *oaxacanum*, *nudum*, *lancerottense*, *japonicum*, *alpestre*, *Douglasii*, *multicaule*, *trullipetalum*, *Celiae*, *multiceps*, *sexangulare*, *rupestre*, *reflexum*, *altissimum*, *anopetalum*, *stenopetalum*, *pruinatum*, *amplexicaule*.

A. FLOWERS WHITE.

(a) Sub-shrubs.

Except for the Siberian *S. populifolium*, which stands quite apart as regards growth-form from all other Eurasian Sedums, the species grouped here are Mexican; of these, *Bourgaei*, *guadalajaranum* and *griseum* are closely allied to each other.

The following white-flowered sub-shrubby species are in cultivation.

<i>populifolium</i> Pallas	<i>allantoides</i> Rose
<i>retusum</i> Hemsley	<i>Bourgaei</i> Hemsley
<i>Adolphi</i> Hamet	<i>guadalajaranum</i> S. Wats.
<i>frutescens</i> Rose	<i>griseum</i> Praeger

58. *Sedum populifolium* Pallas (fig. 78).

S. populifolium Pallas, Reise, 3, 730, tab. O, fig. 1, 1776. Masters in Gard. Chron., 1878, ii. 463.

ILLUSTRATIONS.—Pallas, *loc. cit.* De Candolle, "Plantes Grasses," tab. 110. Bot. Mag., tab. 211. Revue Horticole, 1857, 150, fig. 6.

A most distinct species, standing quite apart in its slender, bushy growth and long-stemmed poplar-like leaves, which fall in autumn.

DESCRIPTION.—A deciduous, glabrous sub-shrub, 1-1½ foot high. *Roots* fibrous. *Stem* erect, slender, woody, much branched, with thin, smooth, dark purple bark. *Leaves* alternate, green, flat, fleshy, stalked; petiole slender, ¾ inch long; lamina ovate, cordate, acute, ¾ inch long, coarsely and irregularly toothed throughout. *Inflorescences* lax, of terminal, much branched, corymbose cymes. *Buds* ovoid, blunt, tipped pink. *Flowers* pale pink or white, ¼ to ⅓ inch across, smelling of hawthorn. *Sepals* green, deltoid, ½ the petals. *Petals* spreading, lanceolate, acute. *Stamens* slightly exceeding the petals, filaments pinkish, anthers red-purple. *Scales* white, quadrate, rather longer than broad. *Carpels* white, erect, shorter than the stamens.

Flowers August.

HABITAT.—Siberia.

Long known in gardens, and deservedly a favourite. It is one of the very few Sedums which have scented flowers, possessing as it does a strong odour of hawthorn. No varieties are recorded. The flowers vary in colour from white to pale pink, and a form received from the Lissadell Nursery, Co. Sligo, has the leaves much less toothed than usual (fig. 78, separate leaf). Appropriately named *populifolium*—poplar-leaved.

59. *Sedum retusum* Hemsley (fig. 79).

S. retusum Hemsley, "Diagnoses Plant. Nov.," 3, 51, 1880. Hemsley, "Biol. Centr. Amer., Bot.," 1, 398. "N. Amer. Flora," 22, 68.

A distinct, erect sub-shrub a foot or so high, easily known by its spathulate leaves deeply notched at the top (but occasionally the notch is absent) and its white flowers with a red eye. *S. oxypetalum* sometimes bears similar notched leaves, but it is a much larger plant with star-like dull-red flowers, while those of *S. retusum* are rather bell-shaped and have blunt petals.

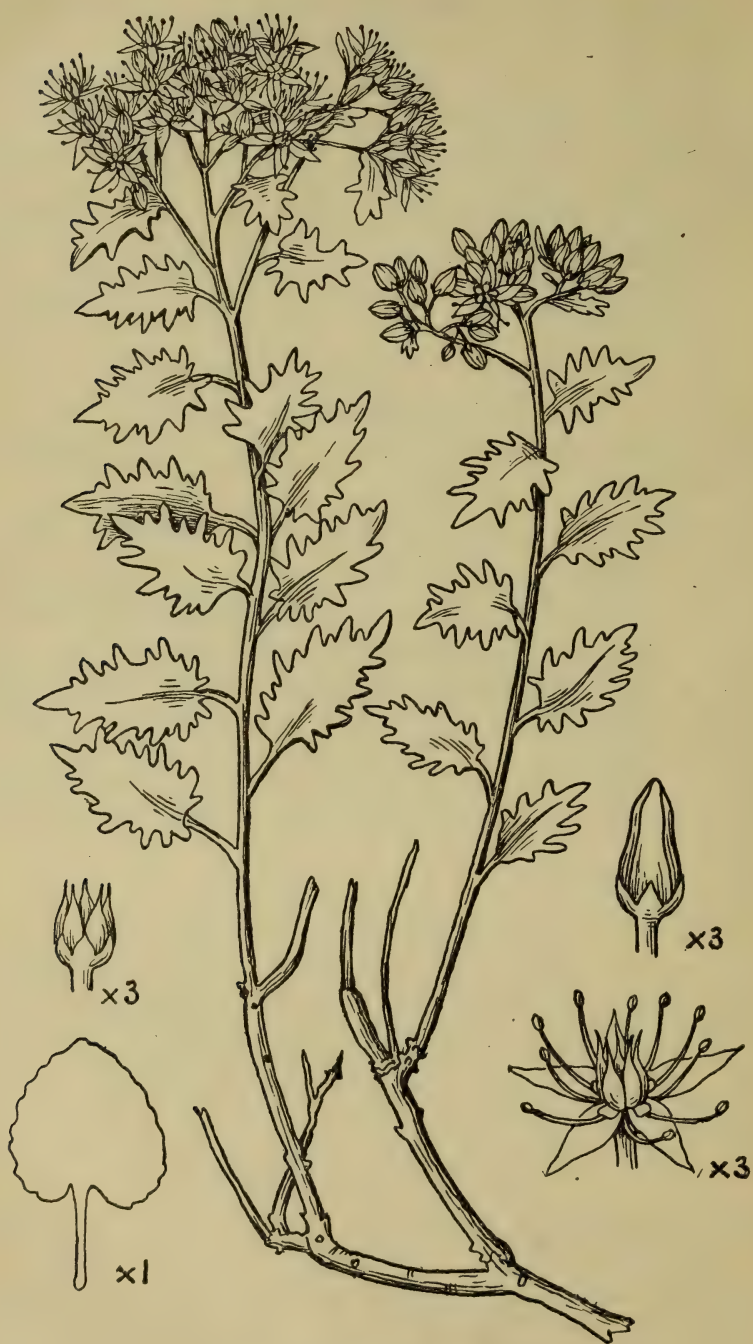


FIG. 78.—*S. populifolium* Pallas.



FIG. 79.—*S. retusum* Hemsley.

DESCRIPTION.—A glabrous evergreen sub-shrub about a foot high, much branched, branches ascending. *Stem* smooth, round, bare and grey below, leafy and rough above. *Leaves* alternate, green, paler beneath, fleshy, spatulate, with a conspicuous blunt notch at apex, tapering to a short petiole, slightly spurred, $\frac{3}{4}$ to 1 inch long by $\frac{1}{4}$ to $\frac{3}{8}$ inch broad. *Inflorescence* terminal, 1–2 inches across, very leafy, of 2–4 simple or forked scorpioid branches with short-stalked flowers in the forks, bracts spatulate, not notched. *Buds* lanceolate, blunt. *Flowers* $\frac{3}{8}$ inch across, sessile except the lowest, 5-parted, not opening widely. *Sepals* very unequal, green, fleshy, oblong-spatulate, blunt, resembling the uppermost bracts, slightly spurred. *Petals* spreading, white with a red base, oblong-lanceolate, blunt, shortly apiculate, $1\frac{1}{2}$ times the sepals, with a green keel on the upper half. *Stamens* spreading, shorter than the petals, filaments red below, white above, anthers red. *Scales* wedge-shaped, orange, longer than broad. *Carpels* erect, red, shorter than the stamens, tapering into long white styles.

Flowers June–July (gentle heat), August–September (cold frame and in the open). Has proved hardy at Dublin; nearly hardy at Waltham Cross (E. A. Bowles).

HABITAT.—San Luis Potosi, Mexico.

Received from Washington and New York, and also (under the name of *anopetalum*) from Rev. R. H. WILMOT; and Mr. E. A. BOWLES has had it for some years at Waltham Cross. It was also formerly in cultivation at Kew, as shown by an excellent coloured drawing (labelled *S. oxypetalum*) by Mrs. BERNARD, with notes by J. D. HOOKER and W. WATSON, preserved in the Kew Herbarium.

Apparently irregular as regards the number of its carpels. HEMSLEY says 6 and ROSE 8. In my plants, received from three different sources (though possibly all had a common origin), they are 5.

The name has reference to the notch which occupies the apex of the leaf.

60. *Sedum Adolphi* Hamet (fig. 80).

S. Adolphi Hamet in *Notizblatt Bot. Gart. Berlin*, 5, 277, 1912.

A stout, very fleshy, Mexican evergreen perennial resembling in habit and leaf *S. Treleasei* Rose, but easily distinguished by its thinner, firmer leaves, which are yellowish with a reddish flush (not densely glaucous-pruinose), and its larger white (not yellow) flowers, borne on long pedicels. Less nearly related to *S. allantoides* Rose and *S. pachyphyllum* Rose, both of which have very blunt terete (not flattened) leaves.

DESCRIPTION.—A loosely bushy, very fleshy, glabrous evergreen perennial. *Roots* fibrous. *Stems* with wide-spreading branches, ascending or sprawling, or tortuous when old, smooth, round, about $\frac{1}{4}$ inch thick, leafy; flowering branches lateral, arising from one of the uppermost leaf-axils, more slender than the barren branches, 3–5 inches long, leafy. *Leaves* alternate, those of barren shoots rather crowded, set at right angles to the stem, curving upwards, very fleshy, firm, broadly lanceolate or oblanceolate, bluntly pointed or sub-acute at apex, narrowing below, sessile, flat on face, about $1\frac{1}{2}$ inch long, $\frac{5}{8}$ inch broad, $\frac{1}{4}$ inch thick, glabrous, yellowish green with reddish margins; those of the flowering shoots similar but smaller, about $\frac{3}{4}$ inch long by $\frac{1}{2}$ inch broad. *Inflorescence* compact, hemispherical, about 2 inches across, of several very short branches bearing long pedicels. *Flowers* $\frac{3}{4}$ inch across, white, starry, on slender, pinkish pedicels $\frac{1}{2}$ inch to $\frac{5}{8}$ inch long. *Buds* slender, bulged $\frac{2}{3}$ way up, where the stamens are situated. *Calyx* small, about $\frac{1}{4}$ inch long, divided about half-



FIG. 80.—*S. Adolphii* Hamet.

way down into unequal teeth, reddish green. *Petals* free, ovate-lanceolate, acuminate, $\frac{3}{4}$ inch long, white, wide-spreading, with a small mucro behind and exceeding the tip. *Stamens* nearly equalling the petals, filaments slightly tapering, white, anthers pale yellow. *Scales* small, quadrate, bluntly retuse, minutely emarginate, reddish. *Carpels* erect, slightly exceeding the stamens, white, with long slender styles.

Flowers March–April. Not hardy.

HABITAT.—Mexico.

With some little hesitation I place the plants from which the above description is taken under Hamet's *S. Adolphi*. The latter was collected in Mexico by PURPUS, and grown (from seed) in Berlin. It is not stated whether the description was drawn from living or dried material. My plant was received from New York Botanic Garden under the name *S. tortuosum* (but that species, as described by HEMSLEY from a single poor specimen in the Kew Herbarium, is clearly different). A plant grown in the Succulent House at Kew without a name, which was received some years ago from Washington and has not flowered since, is identical with my plant so far as leaf and stem characters go. The plant also came to me, in apparently a smaller form, from Missouri Botanic Garden, without a name. No locality is associated with any of these three plants, but they are indubitably, from their affinities, Mexican. The New York plant, which has now flowered at Glasnevin two years in succession, differs from HAMET's description of *S. Adolphi* in the larger size of all its parts (for instance, leaves of barren stems about 40 by 15 mm. instead of 28 by 13 mm., petals 9 mm. long instead of 6 mm.), and in other lesser points, but there are no essential differences, and it is apparently a large form of the species. HAMET, in his description, makes no reference to the colour of the leaves and flowers, which distinguish it at a glance from its nearest ally, *S. Treleasei*, and indeed from any other Mexican *Sedum*.

61. *Sedum frutescens* Rose.

S. frutescens Rose in *Contrib. U.S. Nat. Herb.*, 13, 298, 1911.

A shrubby plant with the tree-like growth of *S. oxypetalum* H. B. and K., but easily separated by its much narrower leaves and white flowers.

DESCRIPTION.—“Leaves linear, flattened, 2 to 6 cm. long, bright green, acute, closely set upon the branches, rounded and free at base; inflorescence a small few-branched cymes; peduncle 1 cm. or less long; branches 3 to 4 cm. long; petals white, 5 to 6 mm. long, acuminate; carpels widely spreading.”—Rose, *loc. cit.*

HABITAT.—Mexico. Not hardy.

Cuttings were kindly sent by Dr. ROSE, but the plant proved hard to grow and died out before flowering; therefore ROSE's description is quoted. A distinct and interesting species.

The name refers to the shrubby nature of the plant.

62. *Sedum allantoides* Rose (fig. 81).

S. allantoides Rose in *Contrib. U.S. Nat. Herb.*, **12**, 440, 1909.

ILLUSTRATIONS.—*Loc. cit.*, pl. 79 (photo). Möller's *Deutsche Gärtner-Zeitung*, 1911, fig. 14 (photo).

A characteristic Mexican type, coming near, in foliage and habit, to *S. pachyphyllum*, which it resembles in its large, blunt, terete, club-shaped leaves. Those of *allantoides* are wholly blue-glaucous, while the leaves of *pachyphyllum* are greener and tipped with red. The shoots of *pachyphyllum*, moreover, are dense and rounded at the tip, owing to the presence of many young leaves, while in *allantoides* young leaves are usually few and small. In flower, as will be seen by the illustrations (figs. 81, 123), the two species are very different.

DESCRIPTION.—An evergreen, smooth, glaucous perennial. *Stem* branching below, woody, bare and declining at base, branches leafy, erect, 1 foot high. *Leaves* alternate, very glaucous, terete, sessile, very blunt, curved upwards, thickest near the tip, inserted at right angles to the stem. *Inflorescence* lax, paniculate, with cymose branches, 4–5 inches long by 3 inches across. *Buds* acute, strongly ribbed. *Flowers* $\frac{3}{8}$ inch diameter, shorter than the pedicels. *Sepals* wide-spreading, fleshy, green-glaucous, lanceolate, acute, $\frac{1}{2}$ inch long, tube very short. *Petals* wide-spreading, greenish white, lanceolate, acute, keeled on back, grooved on face, $1\frac{1}{2}$ times the sepals. *Stamens* spreading, shorter than the petals, filaments white, anthers pinkish. *Scales* yellowish, nearly entire, cuneate, as broad as long. *Carpels* white, erect.

Flowers June–July (gentle heat). Not hardy.

HABITAT.—Hills in Oaxaca, Mexico, at over 2,000 mètres.

Received from Washington; the Kew and Edinburgh Botanic Gardens had it from the same source several years earlier, and, according to MÖLLER'S *Zeitung* (*supra*) it is in cultivation at Darmstadt.

The sepals are variable, being in some plants broader, shorter, and more fleshy than in others (see fig. 81).

The name is derived from the Greek *allantos*, a sausage, from the shape of the leaves.

63. *Sedum Bourgaei* Hemsley (fig. 82).

S. Bourgaei Hemsley, "Diagnoses Plant. Nov.," **1**, 11, 1878. "N. Amer. Flora," **22**, 64, 1905.

ILLUSTRATION.—Hemsley, "Biol. Centr. Amer., Bot.," pl. 20.

A graceful, comparatively tall (1 foot or so), slender plant, allied to *S. guadalupanum* S. Wats. and *S. griseum* Praeger. Distinguished from both by its stronger growth, leaves green and flattened (not glaucous and sub-terete), bright-red branches and conspicuous long dark-purple scales (not short and yellowish or reddish); from the former also by its fibrous (not thickened tuberous) roots, and from the latter by its lax inflorescence.

DESCRIPTION.—A sub-shrubby evergreen perennial. *Stem* slender, smooth, red, erect or ascending, frequently branched, 6–12 inches high, woody and bare below, with many flowering and some barren shoots. *Leaves* alternate, green, sessile, linear, blunt, fleshy, flattened, $\frac{1}{2}$ – $\frac{3}{4}$ inch long by $\frac{1}{10}$ broad by

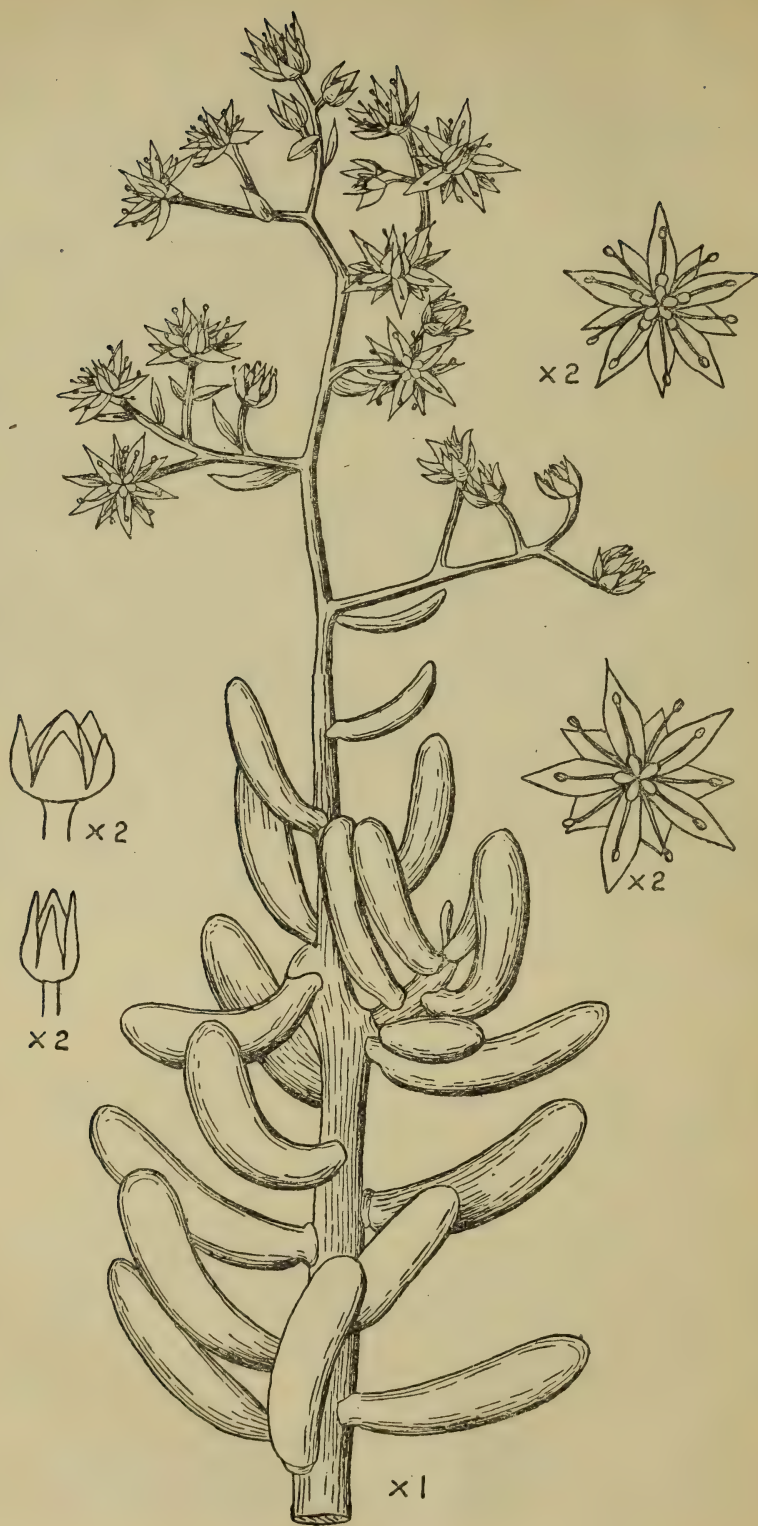


FIG. 81.—*S. allantoides* Rose.



FIG. 82.—*S. Bourgaei* Hemsley.

$\frac{1}{3}$ thick, enlarged but scarcely spurred at base. *Inflorescence* terminal, lax, of about 4 leafy, curved, patent branches, each 1-2 inches long. *Buds* conical, blunt, with wide-spreading sepals. *Flowers* shortly stalked, nearly $\frac{1}{2}$ inch across. *Sepals* resembling the leaves, very unequal, green, fleshy, blunt, separate to the base, where they are slightly enlarged. *Petals* white, often tipped red, patent, ovate-lanceolate, attenuate, keeled, twice the sepals. *Stamens* $\frac{2}{3}$ the petals, filaments white, anthers reddish. *Scales* linear, thrice as long as broad, dark purple, conspicuous when the flower is viewed from above. *Carpels* slender, erect, white, equalling the stamens, with long styles tipped red.

Flowers June-July (gentle heat) ; August-November (cold frame). Nearly hardy at Dublin. Hardy at Rostrevor.

HABITAT.—Central Mexico.

Named in honour of EUGÈNE BOURGEOU, indefatigable collector and traveller, who first gathered it.

64. *Sedum guadalajaranum* S. Watson (fig. 83).

S. guadalajaranum S. Watson, *Proc. Amer. Acad.*, **22**, 411, 1887.

"N. Amer. Flora," **22**, 64, 1905.

A very slender, sub-shrubby, evergreen species, coming near *S. Bourgaei* Hemsley and *S. griseum* Praeger. It differs from both in its thickened rootstock and tuberous roots and very thin wiry stems ; from the former also (to which it comes nearest) in its smaller size, shorter glaucous sub-terete (not green flattened) leaves, shorter, more oblong, less attenuate petals with reddish colour at the base, shorter, less attenuate, green (not white) carpels, and scales short and pale red, not long and dark purple. *S. griseum* is a much stouter little plant, with tapering (not linear) leaves and a dense (not lax) inflorescence.

DESCRIPTION.—A rather glaucous, very slender, wiry, sub-shrubby evergreen perennial, less than a foot high. *Rootstock* horizontal, thickened, with tuberous roots. *Stem* erect, slender, wiry, round, reddish, branching, bare of leaves below, glandular-rough above. *Leaves* rather glaucous, narrowly linear, blunt, sub-terete, slightly flattened above, broadest at the base, slightly spurred, $\frac{1}{2}$ inch long. *Inflorescence* terminal, of 2-3 lax branches with a flower in the fork. *Buds* acute, surrounded by the erect sepals. *Flowers* $\frac{3}{8}$ inch across, sessile. *Sepals* unequal, resembling the leaves, wide-spreading in flower, linear, blunt, scarcely spurred, slightly broader at the base. *Petals* patent, slightly exceeding the sepals, ovate-lanceolate, attenuate, greenish-white, reddish at base, with a reddish keel and red apiculus. *Stamens* nearly equalling the petals, filaments white, anthers dark red. *Scales* reddish, rather longer than broad. *Carpels* slender, erect, light green, with short styles, wide-spreading and red in fruit.

Flowers June (gentle heat) ; July-August (cold frame). Not hardy.

HABITAT.—Rio Blanco, Jalisco, Mexico.

Received from the New York Botanic Garden.

65. *Sedum griseum* Praeger (fig. 84).

S. griseum Praeger in *Journ. of Bot.*, **54**, 43, 1917.

Allied to *S. guadalajaranum* and *S. Bourgaei*, having like them a sub-shrubby habit, very narrow leaves, and white flowers, but it is stouter and more compact than either. *S. guadalajaranum* is separated at once by its thickened rootstock with tuberous roots,



FIG. 83.—*S. guadalajaranum* S. Watson.

as well as by its much slenderer wiry stems, &c. *S. Bourgaei* differs

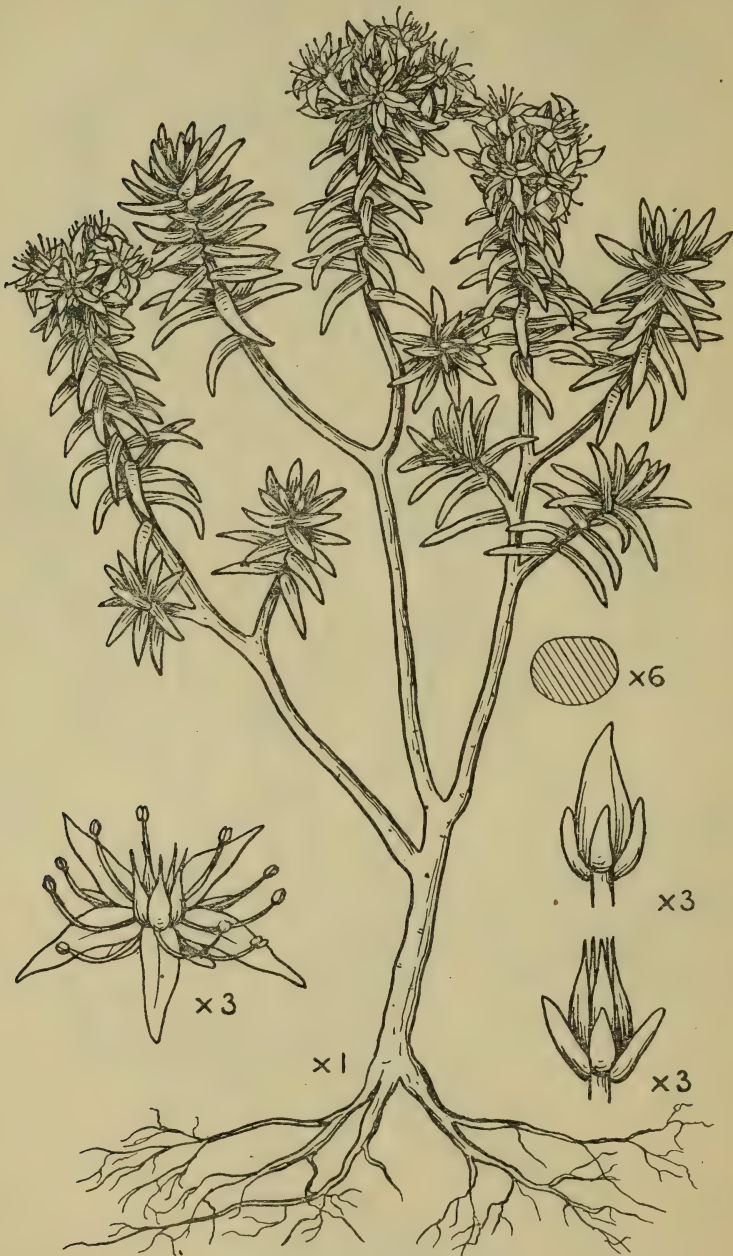


FIG. 84.—*S. griseum* Praeger.

in its longer, more erect, red (not greyish) branches, green (not glaucous) linear (not linear-fusiform) leaves, which are flat above (not sub-terete).

DESCRIPTION.—A small, erect, glaucous evergreen sub-shrub, 6–8 inches high. *Roots* fibrous. *Stem* smooth, round, dull red mottled and dotted with grey, bare below, much branched, branches spreading. *Leaves* alternate, crowded, sessile, linear-fusiform, sub-terete, patent or reflexed, glaucous, blunt, $\frac{1}{2}$ inch long. *Inflorescence* compact, convex, 1 inch across, very leafy. *Buds* tapering, slender, blunt, often curved. *Flowers* $\frac{1}{2}$ inch across, pedicels very short. *Sepals* slightly unequal, green, very fleshy, oblong-tapering, blunt, slightly prolonged below point of insertion. *Petals* quite free, lanceolate, acute, patent or recurved, white with a slight greenish keel, more than twice the sepals. *Stamens* nearly equalling the petals, filaments white, anthers red. *Scales* minute, quadrate, yellowish, with a blunt notch. *Carpels* green, erect, shorter than the stamens, with long slender styles.

Flowers January–February (gentle heat). Not hardy.

HABITAT.—No doubt, Mexico.

Received from New York Botanic Garden labelled *S. Bourgaei* No. 2. Also from Haage und Schmidt, of Erfurt, under the name *S. farinosum*, a misnomer; *S. farinosum* Lowe is a small Madeiran plant related to *S. album*; *S. farinosum* Rose is a flat-leaved Mexican plant, with no affinity to the present species (see p. 141).

Named from the grey colour of the plant.

(b) *Herbs.*

(1) *Leaves flat.*

Ten species fall in here, coming from many different parts of the world. *S. ternatum* and *S. Nevii* from the United States, are allied, as are also *S. moranense* and *S. Liebmannianum*, from Mexico. The Chinese *S. Chaneti* stands quite apart. The remainder are small plants not closely related.

ternatum Michaux

Nevii A. Gray

adenotrichum Wallich

Chaneti Lévillé

alsinefolium Allioni

magellense Tenore

monregalense Balbis

moranense H.B.K.

Liebmannianum Hemsley

compactum Rose

66. *Sedum ternatum* Michaux (fig. 85).

S. ternatum Michaux, "Flor. Bor. Amer.," 1, 277, 1803.

SYNONYM.—*S. portulacoides* Willdenow, "Enum. Hort. Berol.," 484.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 1977. *Bot. Register*, tab. 142. *Garden*, 45, 409. Britton and Brown, "Illustr. Flor. Northern U.S.," 2, 167.

A distinct little plant which, in the arrangement and characters of flowers, shows its affinity to its ally *S. Nevii*, which inhabits much the same area of North America. It is well distinguished among the hardy Sedums by its broad, entire leaves arranged in threes (from which character it takes its name), and largest near the top of the barren shoots, and white flowers with the parts in fours—the latter an almost unique feature in the genus, if we except the section *Rhodiola*.

DESCRIPTION.—A low, glabrous, evergreen perennial, forming a pale-green tuft, with barren and flowering shoots. *Roots* fibrous. *Stems* ascending, rooting below, 3-6 inches high, arising mostly in summer, remaining leafy through the winter, and flowering and dying the following season. *Leaves* sessile, ternate, obovate, tapered below, rounded or blunt-pointed at apex, flat, fleshy, entire, $\frac{1}{2}$ to 1 inch by $\frac{1}{4}$ to $\frac{1}{2}$ inch; those of the barren shoots largest above, forming a loose rosette at the apex; the upper leaves of the flowering shoots small, alternate. *Inflorescence* a 3- to 4-branched cyme, branches patent, each flower subtended by an obovate, rather acute, stalked bract. *Buds* ovate, 4-angled. *Flowers* 4-parted, $\frac{1}{2}$ inch across, sessile. *Sepals* oblanceolate, blunt,



FIG. 85.—*S. ternatum* Michaux.

fleshy, separate to the base, pale green. *Petals* white, narrowly lanceolate, acute, $1\frac{1}{2}$ times the sepals. *Stamens* spreading, equalling the sepals, filaments white, anthers purple. *Scales* yellow, scarcely emarginate, rather longer than broad. *Carpels* oblong, white, erect, spreading later, stellate-patent in fruit; styles $\frac{1}{2}$ the carpels.

Flowers May-June.

HABITAT.—United States east of the Mississippi.

Of easy cultivation, preferring a less dry and exposed position than that in which many *Sedums* feel at home. Not infrequent in cultivation, and usually correctly named. No varieties are on record, and the only one which I have seen is a very dwarf form which was in Canon ELLACOMBE's garden without a history. It differs sufficiently from the type as to deserve a name.

Var. *minus*, var. nov.* (fig. 86).

Much smaller in all its parts; stem 2–3 inches long, leaves $\frac{3}{8}$ inch to $\frac{1}{2}$ inch long; flowers $\frac{3}{8}$ inch diameter. The plant retains its relatively small size under varying conditions.

FIG. 86.—*S. ternatum* var. *minus* nov.

Origin not known, but it is probably an indigenous American form.

67. *Sedum Nevii* A. Gray (fig. 87).

S. Nevii A. Gray, "Manual Botany Northern U.S.," ed. 5, 172, 1867.
Masters in *Gard. Chron.*, 1878, ii. 376. "N. Amer. Flora," 22, 72.

ILLUSTRATIONS.—Meehan, "Native Fl. and Ferns of U.S.," ser. I, 1, pl. 22.
Britton and Brown, "Illustr. Flora Northern U.S.," 2, 168.

A distinct little American plant, preferring, like its compatriot *S. ternatum*, a more sheltered and damper spot than is required by most *Sedums*. It is well distinguished by the pale-green rosettes of its barren shoots and its white five-parted flowers. Not uncommon in cultivation, and constant in character. I find no variation in

* Quam typo multo minus, caule 5–8 cm. (nec 8–15 cm.) longo, foliis 10–13 mm. (nec 25 mm.) longis, floribus 10 mm. (nec 13 mm.) diametro.

about ten plants which I have had from as many different sources. One well-marked variety is discussed below.

DESCRIPTION.—A small, tufted, pale-green rather glaucous perennial. *Stems* short, barren shoots forming rather dense rosettes $\frac{3}{4}$ inch across, flowering shoots ascending, 3-4 inches high. *Leaves* alternate, spatulate, entire, upper edges straight and intersecting at a right angle, long-tapered below, about $\frac{1}{2}$ inch by $\frac{1}{8}$ inch, those of the flowering shoots spatulate-oblong. *Inflorescence* of three or more patent branches, with a flower in the fork. *Buds* ovate, acute, con-



FIG. 87.—*S. Nevii* A. Gray.

spicuously ribbed. *Flowers* usually 5- (sometimes 4- or 6-) parted, $\frac{1}{2}$ inch across. *Sepals* green, fleshy, linear-lanceolate, blunt, slightly longer or shorter than the petals. *Petals* linear-lanceolate, acute, white, keeled. *Stamens* slightly shorter than the petals, filaments white, anthers purple. *Scales* small, white, quadrate. *Carpels* white, at first erect, later spreading, stellate in fruit; styles very short.

Flowers June.

HABITAT.—Eastern United States, Illinois to Alabama.

It is named after its discoverer, Rev. Dr. NEVIUS.

Var. **Beyrichianum** Praeger in *Journ. of Bot.*, 55, 211, 1917 (fig. 88).

S. Beyrichianum Masters in *Gard. Chron.*, 1878, ii. 376.

Plant more diffuse and rather greener. Barren shoots longer, with more distant leaves and a very lax terminal rosette; leaves narrower. Floral parts as in type.

I have discussed Masters' *Sedum Beyrichianum* (*loc. cit.*) and given my reasons for setting it down as a variety of *S. Nevii*. That it is a

native American form is shown by a characteristic specimen of it in the British Museum, labelled *Nevii*, from Peaks of Otter, Virginia,



FIG. 88.—*S. Nevii* var. *Beyrichianum* Praeger.

collected by A. H. CURTISS in 1872; this is even more diffuse and more slender than the cultivated *Beyrichianum*.

It has apparently been in cultivation for a long time. My specimens came from Glasnevin, REGEL and KESSELRING of Petrograd, and Mr. MURRAY HORNIBROOK of Abbeyleix, Queen's County.

68. *Sedum adenotrichum* Wallich (fig. 89).

S. adenotrichum Wallich, "Catalogue" No. 7231. Hooker fl. and Thoms. in *Journ. Linn. Soc., Bot.*, 2, 101 (excluding var. β). C. B. Clarke in Hooker, "Flor. Brit. India," 2, 420.

SYNONYM.—*S. anoicum* Praeger in *Journ. of Bot.*, 57, 52, 1919.

ILLUSTRATION.—Saunders, "Refug. Botan.," tab. 296.

Of the type of the well-known *Sedum spathulifolium* Hooker and of *S. yosemitense* Britton (especially as regards its growth-form), and of some of the species which BRITTON places in a separate genus *Gormaniana*, the leaves being much like those of *Sedum* (*Gormaniana*) *oreganum* Nuttall; but the three species named are all yellow-flowered. In the present plant the rosettes of smooth, spathulate, light-green

leaves, runner-like branches, loose glandular-hairy inflorescences and

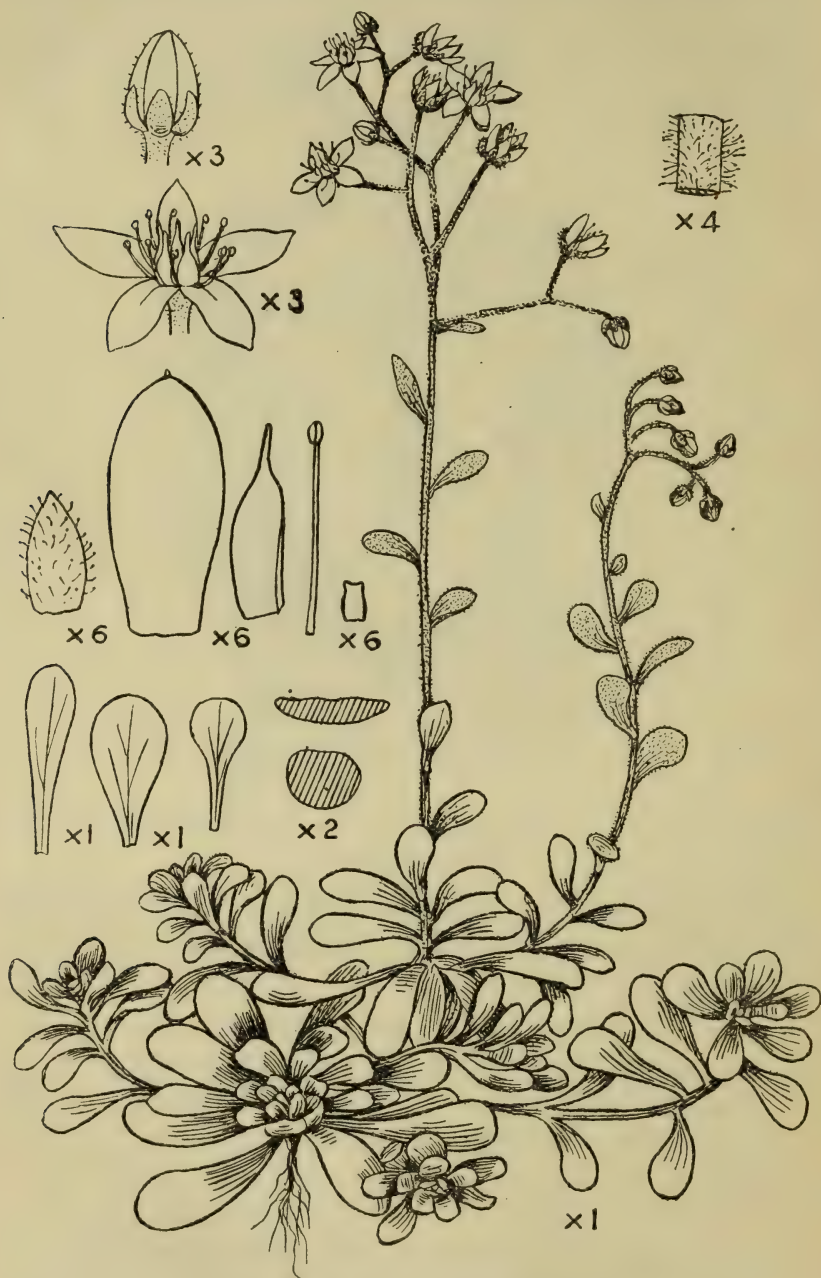


FIG. 89.—*S. adenotrichum* Wallich.

long-stalked white flowers readily distinguish it from any other species.

DESCRIPTION.—A small, creeping, light-green evergreen perennial, forming a loose mat an inch high when not in flower. *Roots* fibrous. *Stems* slender, the barren shoots short (1-3 inches), glabrous, diffuse, leafy, the apex bearing a loose rosette of rather larger leaves, and tending to root, and producing in turn similar short axillary spreading branches below and a terminal flower-stem above. *Flower-stem* erect or inclined, slender, 3-4 inches long, sparingly leafy, glandular-hairy. *Leaves* alternate, those of the rosettes glabrous, fleshy, quite flat on face with a faint median groove, flattish on back, semicircular at apex, cuneate or attenuate-cuneate below, sessile, shining, $\frac{3}{8}$ to 1 inch long, $\frac{1}{4}$ to $\frac{3}{8}$ inch broad; those of the barren shoots below the rosettes glabrous, similar in outline, smaller and often much thickened, some even sub-terete in section (see figure); those of the flower-stems similar to the last, but glandular-hairy, more distant, and diminishing upwards into minute bracts. *Inflorescence* a very lax, glandular, hairy panicle of about 6-12 flowers on long pedicels ($\frac{1}{4}$ to $\frac{1}{2}$ inch) which are decurved before flowering; bracts few, minute. *Buds* broadly ovate, very blunt, $\frac{1}{16}$ inch long. *Flowers* white, $\frac{3}{8}$ inch or a little more in diameter. *Sepals* very fleshy, flat and smooth on face, glandular-hairy and much curved longitudinally and transversely on back, ovate-oblong, rather acute, less than $\frac{1}{2}$ inch long, free almost to the base, green dotted red. *Petals* oblong-ovate or oblong-ovate, semi-erect and rather broad at base, patent in upper two-thirds, blunt, with a minute well-marked apiculus behind the apex, $\frac{1}{4}$ inch long, $\frac{1}{8}$ inch broad, hairy along the midrib on the back. *Stamens* spreading, white, filaments tapering, a little shorter than the petals. *Scales* whitish, twice as long as broad, truncate and retuse at apex. *Carpels* erect, oblong, yellowish-white, narrowing abruptly into short erect styles.

Flowers April-May.

HABITAT.—Himalayas.

This well-marked little species was sent to me with other Sedums from his garden by Mr. MURRAY HORNIBROOK, of Abbeyleix, Queen's County. He could supply no definite history, and as its presumed home was British Columbia I failed to identify it and described it as new (*loc. cit.*, p. 163).

Its name *adenotrichum* signifies gland-haired.

69. *Sedum Chaneti* Léveillé (figs. 90, 91 upper part).

S. Chaneti Léveillé in Fedde, "Repertorium," 5, 99, 1908.

Synonym.—*S. pyramidale* Praeger in *Journ. of Bot.* 54, 42, 1917.

A remarkable species, very different from any other in cultivation. In the barren stage it may be known by its loose rosette of glaucous, very fleshy, linear, spine-tipped leaves about an inch in length; when in flower, its dense pyramid of bloom is quite distinctive. The stalked carpels of its white flowers are also unusual.

DESCRIPTION.—A glaucous perennial, very fleshy and brittle. *Barren stems* very short, emitting short horizontal axillary branches, sparingly leafy, which produce small leafy rosettes and roots at their extremities. *Flower-stems* thick, erect, tapering, leafy, 6-12 inches high, with very many short-branched axillary branches throughout. *Leaves* of barren stems forming loose rosettes, usually linear, straight, entire, sessile, glaucous, slightly rounded on face, much rounded on back, 1 inch long, $\frac{3}{16}$ inch wide, $\frac{1}{16}$ inch thick, very blunt, tipped with a delicate spine $\frac{1}{16}$ inch long, often with a smaller spine beside it (fig. 91, a, d, e, f); at certain stages (? normally in winter or in dry periods) forming small, dense, imbricate sub-globular spiny rosettes, recalling the winter rosettes of *Cotyledons pinosa* L., which develop at first into flat, fleshy, cuneate-spathulate spine-tipped leaves, the edges of which in the superior portion of the leaf are quite thin (see fig. 91, b, c, d); later into linear sub-terete leaves as above; lower leaves of the flowering stems resembling the linear leaves of the barren stems, merging into oblong

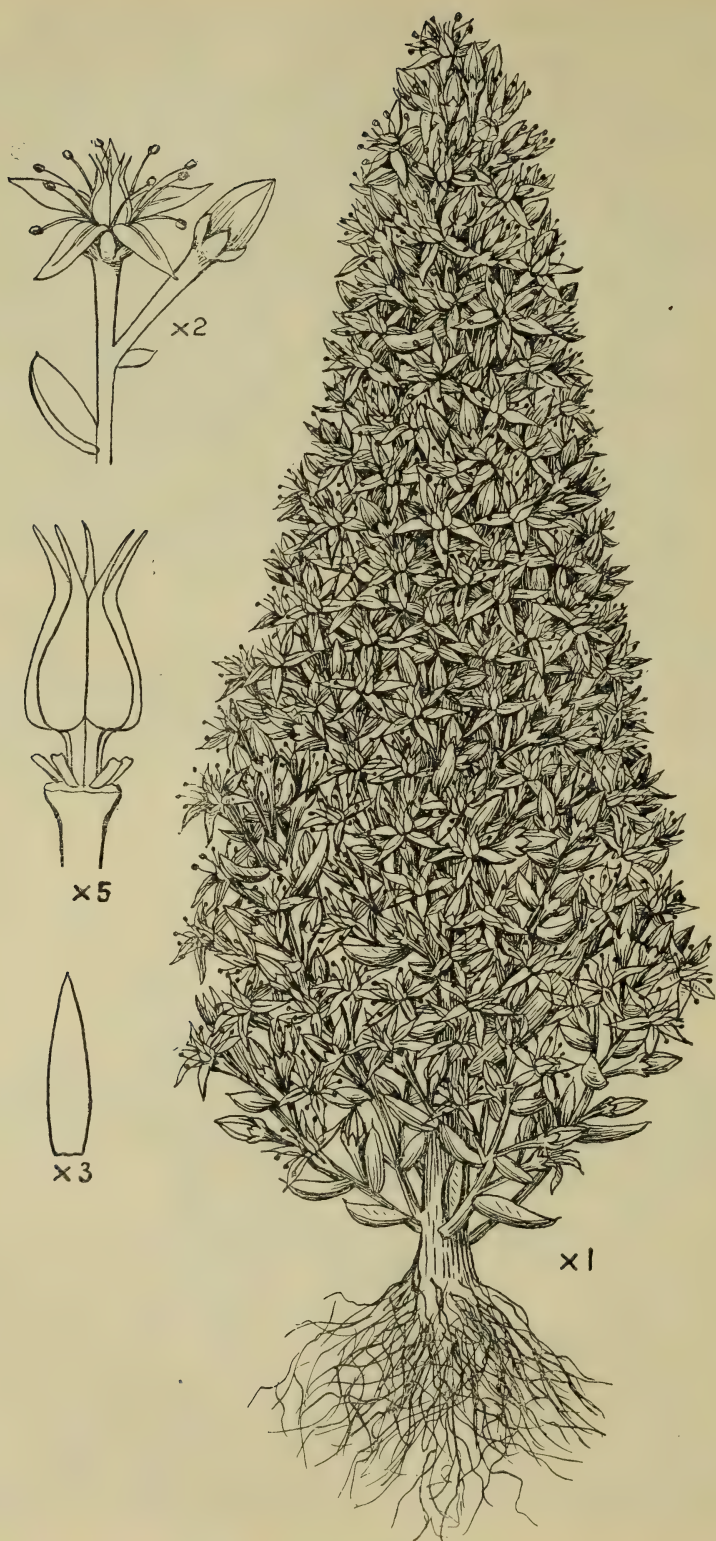


FIG. 90.—*S. Chaneti* Léveillé.

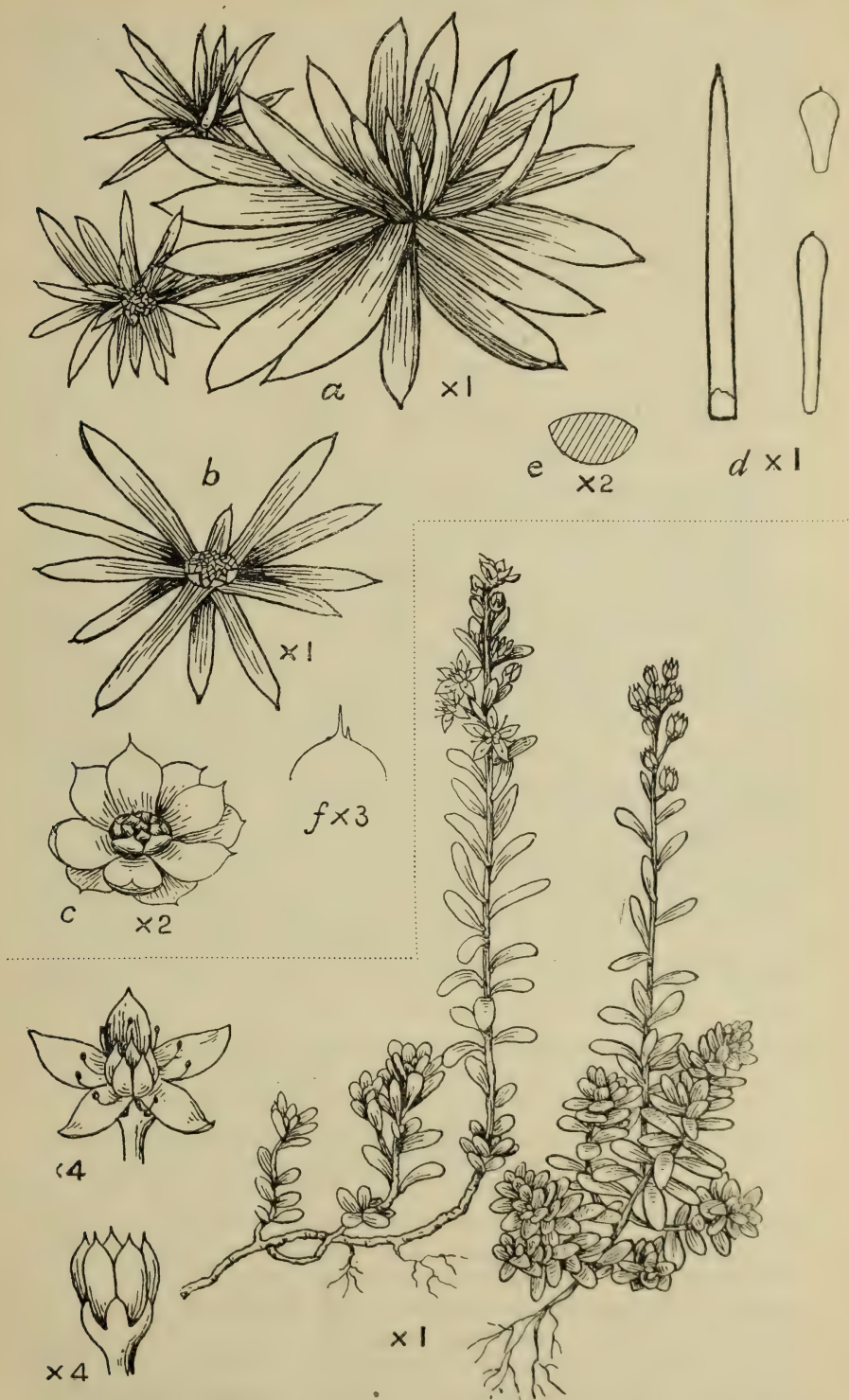


FIG. 91.—Upper portion, *S. Chaneti* Lév. Lower portion, *S. magellense* Tenore.

spine-pointed bracts, which become very small on the branches. *Inflorescence* a dense, very leafy, pyramidal or oblong panicle, extending from near the base of the stem to its apex, and about 2 inches wide; lower branches ascending, upper patent; ultimate bracts minute, subtending the pedicels, which equal or exceed the flowers, and are thickest under the calyx. *Buds* ovate-oblong, white tipped pink. *Flowers* very numerous, $\frac{1}{2}$ inch across, starlike. *Calyx* cup-shaped, green dotted with purple, segments ovate, apiculate, very fleshy, divided to the base. *Corolla* thrice the calyx, funnel-shaped near the base, patent above, petals $\frac{1}{4}$ inch long, lanceolate, acute, with ascending tips, white inside, outside keeled and mottled with red and green near the tip. *Stamens* spreading, slightly shorter than the petals, filaments white, anthers deep purple, the epipetalous ones inserted near the base of the petals. *Scales* pale yellow, spreading, retuse, oblong, twice as long as broad, equalling the stalk of the carpels. *Carpels* nearly equalling the petals, white, tapering into slender divergent styles, abruptly contracted below into a slender stalk, turning rosy in fruit.

Flowers September–October (August in China). Not hardy.

HABITAT.—China: Kansu; Pe-che-li.

The sub-globose spiny buds of flat, cuneate-spathulate leaves which, in cultivation, appear to be produced at irregular periods, probably represent a winter state, and are evidently a resting stage. I have had young plants from Mr. FARRER and from Edinburgh; the fine flowering specimen figured was sent by Mr. E. A. BOWLES.

The quite inadequate description of Lévêillé (*loc. cit.*) led me to consider Mr. FARRER's No. 336 from Kansu as distinct from *Chaneti*, especially when the author of the latter subsequently (*Bull. Geogr. Bot.*, 27, 74, 1917) identified his plant with *S. spinosum* Thunberg (*Cotyledon spinosa* Linn.), a quite different plant with a very dense raceme, well known in gardens and in herbaria; but access to the type of *Chaneti* in the Lévêillé herbarium now at Edinburgh, shows the identity of his plant and mine, so his name stands for this remarkable species.

The following notes supplied by Mr. REGINALD FARRER on the plant in its native surroundings are of interest:

“ Though on roofs in other places, as at Lanchow, I saw isolated plants suggesting No. 336 in very poor form, I am certain of my plant only at and about Siku, abounding on the flat roofs in solid sheets of foliage, very beautiful in their glaucous metallic sheen. I remember particularly how it filled every gully between the tiled ribs of the big military yamen, and how, on the roof of my pony-stall, it made in August a dense jungle of its upstanding stocky spires of white stars—no doubt in character far surpassing all that even Bowles' plant was able to produce, and in appearance most suggesting 8-inch spikes of *Saxifraga longifolia*, on a small, starved scale of blossom. Really a striking plant, but not, I fear, likely to prove hardy or resistant with us. For it thus loves only the hottest and poorest soils and rocks, in the hot, dry region of the Blackwater River's bed; and though it ascends from Siku (6,400) another 2,000 feet on the mountains, where it is sporadic on very hot rocks, it nowhere ascends within reach of the alpine zone. Its kindred vegetation is *Lilium tenuifolium*, *Convolvulus tragacanthoides*, *Leptodermis virgata*, *Hedysarum multijugum*, *Incarvillea variabilis*, and the Asters *hispidus* and *oreophilus*. I should add that in nature it is certainly not monocarpic, but each plant forms a close and ample agglomeration of rosettes, from which

only the flowering ones perish out year by year, exactly as in *Saxifraga Cotyledon*."

Named after its first collector, L. CHANET.

70. *Sedum alsinefolium* Allioni (fig. 92).

S. alsinefolium Allioni, "Flor. Pedemont.," 2, 119, tab. 22, fig. 2, 1785.
Masters in *Gard. Chron.*, 1878, ii. 750.

ILLUSTRATIONS.—Allioni, *loc. cit.* (poor). Cesati, "Stirpes Ital." fasc. 2 (good).

An extremely distinct species, which one would not suspect of being a *Sedum* when out of flower, the small, tufted hairy rosettes suggesting rather a *Saxifrage*. Hairy throughout, even to the back of the petals, which are of unusual breadth. It is not to be mistaken for any other species, its leaves, inflorescence, and flowers being all very distinct (see fig. 92).

DESCRIPTION.—A small tufted perennial, dark green, shining, hairy, sticky. *Barren shoots* short, forming close, flattish rosettes an inch across; *flowering shoots* 4-6 inches high, slender and weak, with spreading branches. *Leaves* of barren shoots stalked, fleshy, hairy on both sides, $\frac{1}{4}$ - $\frac{3}{4}$ inch long; the petiole half the ovate entire lamina, which is bluntly pointed at apex and tapered below; leaves of the flowering shoots larger and more distant, the upper ones sessile. *Inflorescence* a very lax panicle. *Buds* oblong-ovate, apiculate. *Flowers* comparatively few and small, $\frac{1}{4}$ inch across, on long pedicels. *Sepals* erect, green, hairy, fleshy, lanceolate, acute. *Petals* nearly erect in lower part, patent above, thrice the sepals, white, broadly ovate, apiculate, hairy on back. *Stamens* erect, shorter than the petals, filaments white, anthers pinkish. *Scales* bright red. *Carpels* green, erect, equalling the stamens, styles divergent.

Flowers June-July.

Rare in cultivation. I have seen it at Glasnevin (whither the late C. F. BALL brought it from the Alps), Kew, and Edinburgh; M. CORREVON sent it to Wisley, and MASTERS enters it in 1878 as seen by him in the living state, presumably in a garden. Rare in the wild state, being confined to Piedmont, the Alpes Maritimes, and Liguria. In my garden I found protection from slugs was desirable.

The name comes from the likeness of its leaves to those of an *Alsine*.

71. *Sedum magellense* Tenore (fig. 91, lower part).

S. magellense Tenore, *Flor. Napolitana*, 1, xxvi. 1811-15.

SYNONYM.—*S. olympicum* Boissier, "Diagnoses Plant. Nov.," Ser. 1, 3, 16, 1843.
ILLUSTRATIONS.—Tenore, *loc. cit.*, tab. 139, fig. 1. Raulin, "Crète," tab. 13, fig. c. Verh. z.-b. Gesellsch. Wien, 16, tab. 9-10, 1866.

A very distinct little plant, known at once by its racemose inflorescence, which is 1-2 inches long and only about $\frac{1}{4}$ inch broad, and its bright green, flat, obovate leaves $\frac{1}{4}$ inch long on the barren shoots. The oblong carpels, too, are very unusual. There is some variation as regards the flowers, which are sometimes pure white, or have a greenish or purplish tinge, and are larger in some forms than in others.

DESCRIPTION.—A small, bright-green evergreen perennial. *Roots* fibrous. *Stems* twiggly below, slender, rooting; barren shoots short, with crowded leaves, flowering shoots erect or ascending, 3-4 inches long, sometimes branched, leafy. *Leaves* alternate or opposite, glabrous, obovate, flat, fleshy, blunt, sessile, $\frac{1}{4}$ inch



FIG. 92.—*S. alsinefolium* Allioni.

long; those of the flowering shoots oblong, $\frac{3}{8}$ inch long. *Inflorescence* a leafy raceme 1-2 inches long, sometimes branched, with the flowers solitary or several together on short, slender branches. *Flowers* white or whitish, $\frac{1}{4}$ inch across. *Calyx* green, cup-shaped, the triangular teeth equalling the tube. *Petals* lanceolate, acute, apiculate, wide-spreading, more than twice the calyx. *Stamens* shorter than the petals, filaments white, anthers red or purple. *Scales* spatulate, thrice as long as broad, yellowish, emarginate. *Carpels* green,

erect, equalling the stamens ; in fruit oblong, broadest near the tip, with a short, abrupt beak.

Flowers May-June, and often again later.

HABITAT.—Italy, Greece, Asia Minor.

A form from the rock garden at Dahlem has very large flowers, $\frac{3}{8}$ inch across, pure white, and leaves mostly opposite ; another from the same source has leaves broader and thicker than usual and $\frac{3}{8}$ inch flowers tinged purple ; a third, received from F. SÜNDERMANN, of Lindau, has greenish-white flowers of the normal size ($\frac{1}{4}$ inch) and alternate leaves.

Named after Monte Majella in Central Italy, the original station for the plant.

72. *Sedum monregalense* Balbis (fig. 93).

S. monregalense Balbis, "Miscell. Bot.," 23, 1804. Masters in *Gard. Chron.*, 1878, ii. 716.

SYNONYM.—*S. cruciatum* Desfontaines, "Cat. Plant. Paris," 162, 1829.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 64a. Balbis, *loc. cit.*, tab. 6. Cusin and Ansberque, "Herb. Flor. Française," Crassul., tab. 19.

A slender little plant, distinguished by its small oblanceolate leaves in whorls of four, and lax, hairy, branching inflorescence of white flowers.

DESCRIPTION.—A slender, weak perennial. *Stems* decumbent and rooting below, very erect above, the barren ones 1-2 inches high, glabrous or nearly so ; flowering stems 3-5 inches, hairy in the upper part, with axillary ascending branches throughout or towards the top. *Leaves* in whorls of 4, crowded, oblanceolate, blunt, fleshy, green, smooth or slightly glandular near the tip, $\frac{1}{4}$ inch long ; those of the flower-stems similar, whorls distant, the upper ones hairy. *Inflorescence* a loose-panicked cyme, with alternate hairy bracts and long pedicels. *Buds* ovate, apiculate. *Flowers* $\frac{3}{8}$ inch across. *Sepals* green, fleshy, ovate, acute, hairy. *Petals* white, ovate, acute, wide-spreading or slightly reflexed, with a greenish hairy keel, thrice the sepals. *Stamens* spreading, slightly shorter than the petals, anthers reddish. *Scales* small, white. *Carpels* whitish, erect, nearly erect in fruit.

Flowers July-August.

HABITAT.—South-east France, Corsica, Italy.

Rare in cultivation. I have seen it at the Botanic Gardens at Bremen and Edinburgh, and received it from the Tully Nursery, Co. Kildare, in all cases under the name *magellense*. It succeeds best in a damp, shady place.

73. *Sedum moranense* H. B. and K. (fig. 94).

S. moranense Humboldt, Bonpland, and Kunth, "Nov. Gen. et Sp.," 6, 44, 1823. Hemsley, "Biol. Centr. Amer., Bot.," 1, 397. "N. Amer. Flora," 22, 63.

SYNONYMS.—*S. Liebmannianum* of some gardens (not of Hemsley, see p. 174). *S. Greggii* of some gardens (not of Hemsley, which is a small yellow-flowered species not in cultivation, so far as I am aware).

A distinct little bushy plant typically some 3-4 inches high, with much-branched wiry red stems, bare below, clothed above with small

triangular fleshy leaves, and bearing small terminal cymes of few



FIG. 93.—*S. monregalense* Balbis.

white starry flowers. It has been long in cultivation, and is usually found in gardens under the erroneous names of *Liebmannianum* or *Greggii*. It is allied to the former (see p. 174), which, however, is

easily distinguished by its peculiar stems, the lower part of which is thick and silvery-white, owing to the presence of the bleached bases of the old leaves ; the latter is a quite different plant with yellow flowers.

DESCRIPTION.—A low, much-branched glabrous evergreen perennial. *Main roots* long, fleshy, resembling radishes. *Stem* in lower part procumbent and

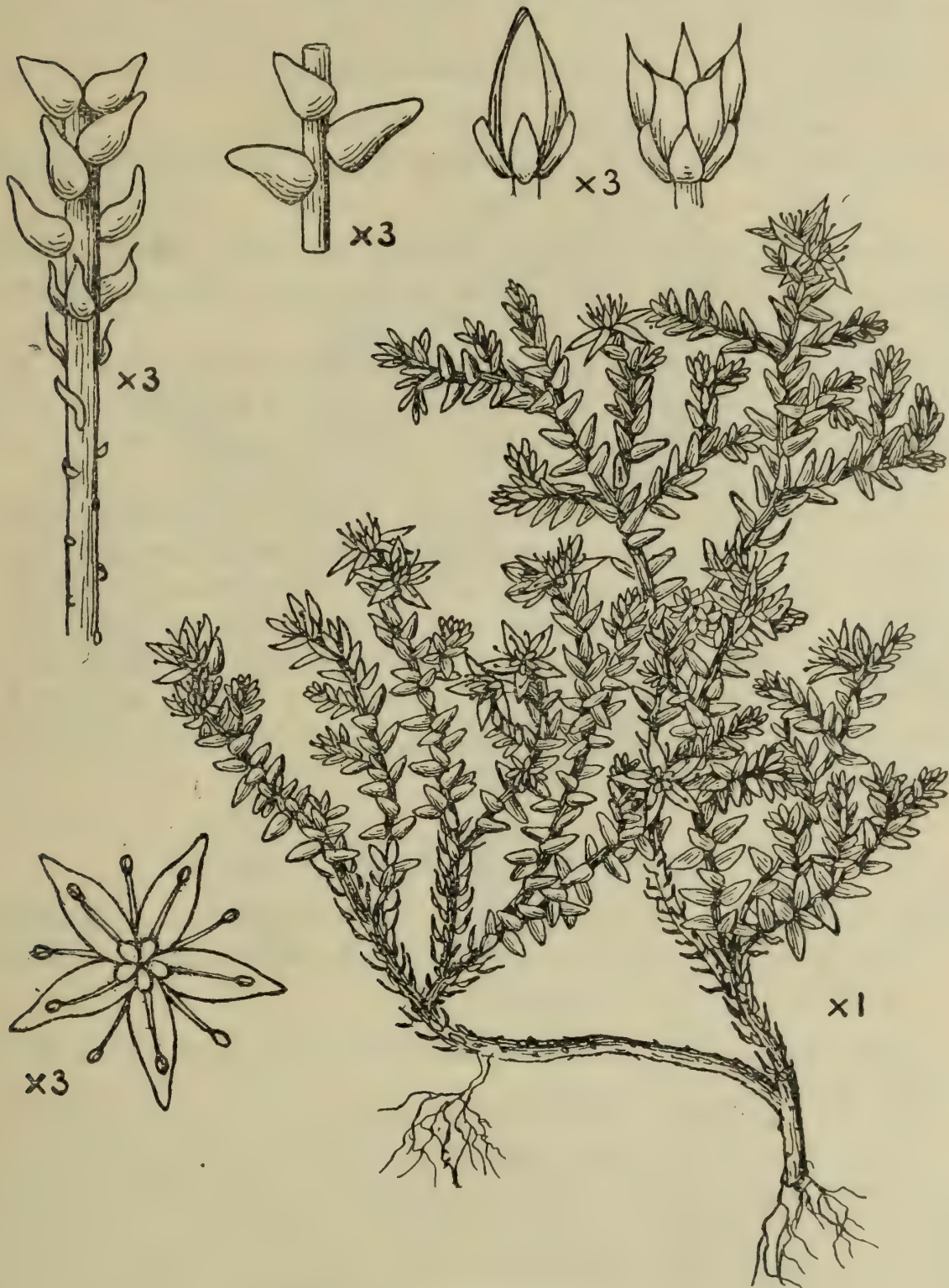


FIG. 94.—*S. moranense* H. B. & K.

rooting, thin, red, bare and smooth save for leaf scars ; branches many, spreading, leafy. *Leaves* crowded, triangular, sessile, rounded below, tip blunt, about $\frac{1}{8}$ inch long by $\frac{1}{16}$ inch broad, nearly as thick as broad, glabrous, green, set at right angles to the stem. *Inflorescence* small, terminal, of about 2 short branches, each bearing several sessile flowers. *Buds* ovate-oblong, blunt. *Flowers* $\frac{3}{8}$ inch across. *Sepals* separate to base, linear-lanceolate, blunt, fleshy, slightly spurred. *Petals* wide-spreading, thrice the sepals, lanceolate, blunt, slightly apiculate, white, tinged red on back. *Stamens* slightly shorter than petals,

filaments white, anthers purple. *Scales* white, emarginate, longer than broad. *Carpels* erect, shorter than the stamens, white, later reddish and slightly spreading; in fruit bright red, wide-spreading.

Flowers July. Apparently hardy throughout the British Isles.

HABITAT.—Real de Moran, South Mexico.

The name is derived from the type locality.

Var. **arboreum** Praeger.

S. arboreum Masters in *Gard. Chron.*, 1878, ii. 717.

S. moranense H. B. K. var. *arboreum* Praeger in *Journ. of Bot.*, 55, 211, 1917.

Stem erect, much-branched, fastigiate, and often fasciate at the tips; a little upright bush 6–11 inches high, the stems sometimes as much as $\frac{1}{4}$ inch thick.

The type as found in gardens is somewhat variable in habit and stoutness. Occasionally the leaves are arranged in five spiral rows, which gives the plant an unfamiliar appearance. It varies much also as regards floriferousness.

The variety is very distinct in habit. Dr. MASTERS, when working at the genus *Sedum*, found this erect form in various gardens labelled *S. arboreum* or *arborescens*, and described it (*loc. cit.*) as a new species under the former name. It has evidently been in cultivation for a long time, and was one of the earliest known of Mexican *Sedums*. A fine specimen of it in the Kew herbarium, 9 to 11 inches in height, collected by C. E. PRINGLE at 10,000 feet in the Sierra de Pachuca, shows that var. *arboreum* is a native Mexican form.

74. ***Sedum Liebmannianum*** Hemsley (fig. 95).

S. Liebmannianum Hemsley, "Diagnoses Plant. Nov.," 1, 12, 1878.

Hemsley, "Biol. Centr. Amer., Bot.," 1, 396. Rose in "Contrib. U.S. Nat. Herb.," 13, 299, 1911.

SYNONYM.—*S. moranense* Britton and Rose in "N. Amer. Flora," 23, 63 (not of H. B. and K., see p. 171).

ILLUSTRATION.—Rose, *loc. cit.*, pl. 56 (photo).

There has been confusion regarding this plant, arising from its similarity in some points to *S. moranense* H. B. K. HEMSLEY, in his original description (*loc. cit.* 1878), does not refer to the most striking character of the plant, namely the persistent white inflated bases of the withered leaves, which give it a very distinct and peculiar appearance. HEMSLEY's type specimens at Kew (Yavesia, Oaxaca, 7,500 feet, Liebmann [1841–43]) are now in very poor condition, but nevertheless this character is apparent.

Two years later, in *Gard. Chron.*, 1880, ii. 38, HEMSLEY published a fresh description "enlarged from the living plant at Kew," but the living plant in question was not *Liebmannianum*, but *moranense*, as shown by the type specimen of this description (so labelled by N. E.

Brown) preserved at Kew, as well as by internal evidence (e.g. "ramis rubris").

ROSE in "North American Flora" (1905) unites the two species under the older name. Soon after, *S. Liebmannianum* was rediscovered in Mexico by C. A. PURPUS and grown at Washington, where ROSE was about to describe it as a new species when its identity with HEMSLEY'S plant was recognized. He redescribed it in 1911 (*loc. cit.*) pointing out its most remarkable character—the thickened



FIG. 95.—*S. Liebmannianum* Hemsley.

white stem due to the persistent inflated leaf-bases, and added a photograph in which this character is plainly seen.

In leaf and flower the two species come pretty close, but the leaves of *Liebmannianum* are larger and quite imbricated, and the petals are more sharply pointed. It is, moreover, nearly deciduous, the young leaves alone remaining through the winter and assuming a brown tint; and it is tender, while *moranense* is thoroughly evergreen and hardy.

DESCRIPTION.—A small almost deciduous glabrous perennial, 2-6 inches high. Stems procumbent and rooting below, ascending, branched, thickened to $\frac{1}{8}$ inch diameter by the persistent loose silvery bases of the old leaves, each with a black tip representing the lamina. Leaves crowded, oblong, blunt, very fleshy, sessile, $\frac{3}{16}$ inch long, green, tipped red. Inflorescence terminal, few-flowered. Buds oblong-ovate, rather blunt. Flowers 5-parted, sessile, $\frac{3}{8}$ inch across. Sepals

linear-lanceolate, blunt, green, very fleshy, resembling the leaves. *Petals* white, lanceolate, rather acute, keeled, wide-spreading, twice the sepals. *Stamens* slightly shorter than petals, filaments white, anthers red. *Scales* small, yellowish, broader than long. *Carpels* erect, greenish, shorter than the stamens.

Flowers June (gentle heat), July–August (cold frame). Not hardy.

HABITAT.—San Luis Potosi and Oaxaca, Mexico.

I have the plant from Washington, New York, and Edinburgh.

The name commemorates the Danish botanist F. LIEBMANN, who collected extensively in Mexico.

75. *Sedum compactum* Rose (fig. 96).

S. compactum Rose in "Contrib. U.S. Nat. Herb.," 13, 297, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 53 (photo).

A tiny creeping plant resembling *S. humifusum* in size and habit, but at once separated at any stage of growth by its glabrous leaves ;

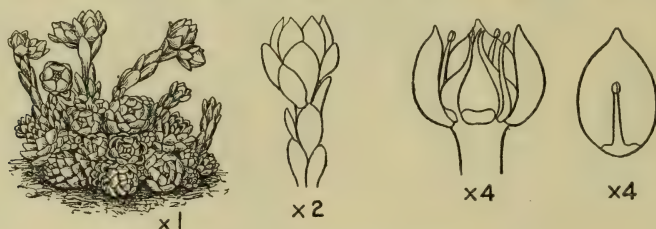


FIG. 96.—*S. compactum* Rose.

those of *S. humifusum* are strongly ciliate. In flower, the almost globular scented white blossoms are quite peculiar ; those of *humifusum* are star-like, yellow and scentless.

DESCRIPTION.—Evergreen, perennial, minute, creeping, forming a close greyish mat. *Stems* very short, much branched. *Flower-stems* an inch high, erect, leafy. *Leaves* of barren stems densely imbricate, glabrous, greyish green, sometimes dotted purple, obovate, blunt, very fleshy, flat on face, rounded on back, $\frac{1}{8}$ inch long ; leaves of flower-stems looser and larger. *Inflorescence* terminal, of 2–3 flowers. *Buds* ovate. *Flowers* sub-globose, a little over $\frac{1}{8}$ inch long. *Sepals* ovate, blunt, fleshy, concave, purplish. *Petals* oval, apiculate, white, concave, twice the sepals. *Stamens* curved, $\frac{2}{3}$ the petals, anthers yellow. *Scales* large, broad, yellow. *Carpels* short, erect, greenish.

Flowers June (gentle heat) ; July (cold frame). Not hardy.

HABITAT.—Oaxaca, Mexico.

Received from Washington and Edinburgh. The blossoms have a strong odour resembling elder flowers—scented blossoms are extremely rare in *Sedum*.

The specific name has reference to its close habit.

(2) Leaves terete or sub-terete.

A tolerably homogeneous group of European species with two from Western Asia. *S. dasyphyllum* and *S. brevifolium* are closely allied, as are also the two Asiatic species, *S. gracile* and *S. Alberti*.

The leaves of the Spanish *S. gypsicolium* incline to flatness, but its flowers place it close to *S. album*.

dasyphyllum Linn.

brevifolium DC.

anglicum Huds.

album Linn.

gypsicolium Boiss. and Reut.

hirsutum All.

Lydium Boiss.

gracile C. A. Meyer.

Alberti Regel.

76. *Sedum dasyphyllum* Linn. (fig. 97).

S. dasyphyllum Linn., "Species Plantarum," 431, 1753. Masters in *Gard. Chron.*, 1878, ii. 716.

ILLUSTRATIONS.—Sowerby, "English Bot.," ed. 3, pl. 530. Reichenbach, "Flor. German.," 23, tab. 56. Curtis, "Flora Londin.," 1, pl. 115. Tenore,



FIG. 97.—*S. dasyphyllum* Linn.

"Flor. Napol.," tab. 229. Jacquin, "Hort. Vindobon.," 2, tab. 153. Cusin and Ansperque, "Herb. Flor. Française, Crassul.," tab. 23.

Recognized by its very small size, pinkish-grey colour, pinkish-white flowers, and opposite, egg-shaped, more or less hairy leaves. Even when the barren shoots are nearly without hairs, the inflorescence shows the characteristic pubescence.

DESCRIPTION.—A small evergreen tufted perennial, 1–2 inches high. Stems wiry, much branched below, with ascending branches, the barren ones short, densely leafy with opposite leaves, the flowering shoots taller, with larger more distant leaves which are opposite or alternate. Leaves ovoid to obovoid, slightly flattened on face, glaucous, more or less glandular-pubescent, $\frac{1}{4}$ to $\frac{3}{16}$ inch long. Buds obovate, very blunt. Inflorescence small, 2-branched, pubescent, of 2–4 flowers, pedicels equalling the flowers. Flowers usually 5-, sometimes 6-parted, $\frac{1}{4}$ inch across. Sepals small, ovate, very fleshy, separate to the base. Petals oblongate, apiculate, white on face with a yellowish base, pinkish on back, wide-spreading, thrice the sepals. Stamens slightly shorter than petals, filaments white, anthers purple. Scales yellow, spatulate. Carpels greenish, erect, equalling the stamens, nearly erect in fruit.

Flowers June. Hardy.

HABITAT.—Europe (excluding the north), N. Africa. Occurs on old walls in the southern part of the British Isles from Cambridge to Cork, but probably not native.

It is shy of moisture, but loves an old wall, on which it speedily naturalizes itself and spreads.

The specific name refers to the very thick leaves.

Var. **glanduliferum** Moris, "Flor. Sardoæ," 2, 125, 1840.

SYNONYMS.—*S. glanduliferum* Gussone, "Floræ Siculæ Prodromus," 1, 519. *S. corsicum*, Duby in De Candolle, "Botanicon Gallicum," ed. 2, 1, 202.

ILLUSTRATIONS.—*Bot. Mag.* pl. 6027. *Garden*, 1885, p. 314. Tenore, "Flor. Napol.," tab. 232. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 24.

Whole plant densely glandular pubescent, of same size as the type.

The species is variable as regards the distribution and amount of hairiness, but this extreme form is distinct, and a very beautiful object under the lens.

Var. **macrophyllum** Rouy and Camus, "Flore de France," 7, 115, 1901 (as sub-var.) (char. emend.).

"Feuilles largement ovoïdes, très épaisses, grandes (5-10 millim. de long) ; tiges, feuilles, rejets, inflorescence glabres." I have found



FIG. 98.—*S. dasyphyllum* var. *Suendermanni* Praeger.

several very large forms in cultivation agreeing with var. *macrophyllum*, except that the plants vary from almost glabrous to rather hairy ; it seems best to extend the description so as to include all, as the large size is the striking character, and hairiness is so variable in the species.

Var. **Suendermanni** Praeger in *Journ. of Bot.*, 57, 50, 1919 (fig. 98).

Plant larger than in type, leaves of barren shoots densely imbricate, obovate, bluntly pointed at apex, cuneate below, flat on face, densely glandular-hairy ; inflorescence larger and more branched than in type ; calyx half as long as the corolla ; flowers large, $\frac{7}{16}$ inch diameter, petals 5 to 7 in number (usually 6). Flowers late July, about six weeks after *dasyphyllum* type.

A peculiar form, well distinguished by its densely imbricated leaves and abundant, very large flowers, which in diameter are one and a half times the size of those of the type.

It was collected in Spain by F. SÜNDERMANN of Lindau (see his Catalogue for 1913), and distributed under the name *S. rivulare*; but *S. rivulare* Boissier (= *S. melanantherum* DC.) is a different plant, resembling a slender *S. anglicum* (for illustration see Boissier, "Voyage Midi d'Espagne," tab. 63).

I have grown a large series of *dasyphyllum* forms, collected mainly from garden sources, and find them puzzling. They vary much, in the first place, in size (from type to *macrophyllum*); next, in hairiness, from quite glabrous (sub-var. *glabratum* Rouy and Camus), sent by Dr. SCHROETER from Zurich, and collected on a wall at Middleton, Co.



FIG. 99.—*S. brevifolium* DC.

Cork, to the densely hairy *glanduliferum*. Then one very hairy form has leaves which readily drop off, so that after heavy rain the stems are almost bare and the fallen leaves soon form a dense mat of young plants; while in other hairy forms the leaves are firmly attached.

According to KERNER, the flowers are sometimes replaced by leaf-buds.

77. *Sedum brevifolium* DC. (fig. 99).

S. brevifolium De Candolle, "Rapports Voyages," 2, 79, 1808. Masters in *Gard. Chron.* 1878, ii. 717.

SYNONYMS.—*S. farinosum* of gardens (not of Lowe, which is a Madeira plant allied to *album*, and not in cultivation so far as I am aware). *S. Pittoni* (a *nomen nudum*) of gardens.

ILLUSTRATIONS.—De Candolle, "Mém. Crassul.," plate 4A. Cusin, and Ansberque, "Herb. Flor. Française, Crassul.," tab. 23.

A delightful, tiny plant, known at once by its sub-globular mealy reddish leaves, arranged in four close vertical rows, and small white flowers.

DESCRIPTION.—A minute evergreen perennial, creeping, mealy, 1–2 inches high. *Stems* wiry, bare, branched, many, ascending, very leafy. *Leaves* opposite, ovoid or sub-globose, $\frac{1}{2}$ inch long, white-mealy, flushed red or purple, arranged in four close rows, alternate and usually not larger on the flowering shoots. *Inflorescence* small, few-flowered. *Buds* ovate, blunt. *Flowers* $\frac{5}{16}$ inch across, pedicels very slender, equalling the flowers. *Sepals* ovate-lanceolate, acute, fleshy, mealy, flushed red. *Petals* white, ovate, apiculate, 3 times the sepals, with a strong red nerve on back. *Stamens* shorter than the



FIG. 100.—*S. brevisfolium* var. *quinquefarium* var. nov.

petals, filaments white, anthers purple. *Scales* quadrate, yellow. *Carpels* white, erect, shorter than the stamens, erect also in fruit.

Flowers July. Hardy if kept dry.

HABITAT.—South-west Europe, Morocco.

Var. *quinquefarium* var. nov.* (fig. 100).

DESCRIPTION.—*Stem* twice as thick and twice as long as in type. *Leaves* much larger, arranged in five spiral rows, $\frac{3}{16}$ inch long on the barren stems, up to $\frac{5}{16}$ inch long on the flowering stems. *Flowers* as in the type.

A very distinct-looking plant which, in the absence of floral differences, must be placed under *brevifolium*. In its larger 5-ranked

* *Caules* quam in typo duplo crassiores et duplo longiores. *Folia* in quinque ordines spirales disposita, ea surculorum sterilium ad 5 mm. longa, ea surculorum floriferorum ad 8 mm. longa.

leaves and strong large-leaved flowering shoots, it differs much from the type. I have seen it only at Edinburgh Botanic Garden, where it bore the name *dasyphyllum*. Origin unknown.

OBSERVATION.—Var. *Pottsii* of gardens. The so-called var. *Pottsii* was brought by the late Mr. POTTS of Edinburgh from the Jardin des Plantes in Paris about 1875; it is stated (see *Gard. Chronicle*, 1907, ii. 275) to be smaller in all its parts than the type. The plant as I have seen it in several gardens is not distinct, and Sir ISAAC BAYLEY BALFOUR, who is well versed in its history, confirms the opinion that it is only type.

A var. *majus* has been mentioned in gardening papers, but I know nothing of it.

S. brevifolium needs perfect drainage for its successful cultivation. Save for the Kew plant, all the half-dozen specimens which I have



FIG. 101.—*S. anglicum* Hudson.

seen were labelled with the erroneous names of *farinosum* or *Pittoni*. The specific name is descriptive of the very short leaves.

78. *Sedum anglicum* Hudson (fig. 101).

S. anglicum Hudson, "Flora Anglica" (ed. 2), 196, 1778. Masters in *Gard. Chron.* 1878, ii. 716.

ILLUSTRATIONS.—Sowerby, "Engl. Bot." (ed. 3), pl. 531. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 22.

A pretty little plant, brightening rocky ground in our islands with its pinkish starry flowers, and later its red fruit. When out of

flower it rather resembles *S. acre*, but may then be known by its leaves broadest about the middle, not at the base. Its flat leaves and inflorescence of 2 (or at most 3) branches borne on stems only 1 to 2 inches high, distinguish it from small forms of *S. album*.

DESCRIPTION.—A minute, mat-forming, glabrous evergreen perennial. *Stem* slender, creeping and rooting, with many ascending barren and flowering shoots 1–2 inches high. *Leaves* alternate, crowded, often tinged red, sessile, elliptic, blunt, clasping, very thick, rounded on both faces, $\frac{1}{8}$ to $\frac{3}{16}$ inch long, set at right angles to the stem, with a slight spur not addressed to the stem. *Inflorescence* usually of 2 wide-spreading simple branches bearing each 3 to 6 flowers, with a flower in the fork. *Buds* ovate, blunt. *Flowers* $\frac{1}{2}$ inch across. *Sepals* ovate, blunt, very fleshy, resembling the leaves, separate to the base. *Petals* more than twice the sepals, lanceolate, apiculate, white, flushed pink on back, keeled. *Stamens* spreading, equalling the petals, filaments white, anthers purple. *Scales* crimson, spatulate, twice as long as broad. *Carpels* slightly spreading, nearly as long as the petals, white, turning red later, erect in fruit.

Flowers June–July. Hardy.

HABITAT.—Western Europe, from Norway to Spain.

It derives its name from the fact that it was first described from English specimens.

Var. *minus* var. nov.*

Plant very small, the leaves and flowers being $\frac{2}{3}$ of the normal size (linear). Flowers pinker.

A very pretty and distinct little plant, obtained in the garden of Mr. E. A. BOWLES at Waltham Cross. No doubt a wild form.

79. *Sedum album* Linn. (fig. 102).

S. album Linn., "Species Plantarum," 432, 1753. Masters in *Gard. Chron.* 1878, ii. 717.

SYNONYMS.—*S. Alberti* of gardens (not of Regel, see p. 191; nor of Regel's "Gartenflora," tab. 1019, fig. 2); *S. balticum* Hartm.

ILLUSTRATIONS.—Sowerby, "English Bot." ed. 3, pl. 529, fig. 1. Reichenbach, "Flor. German.," 23, tab. 55. De Candolle, "Plantes Grasses," tab. 22. "Flora Danica," 1, tab. 66. Curtis, "Flor. Londin.," 2, pl. 52. Allioni, "Flor. Pedemont.," 3, tab. 65. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 20. Plenck, "Icones Plant. Medicinalium," tab. 352.

Though varying much in shape and colour of leaf, this common species, which masquerades in gardens under many names, is always easily recognized, as no other species has any close resemblance to it. In the vegetative parts the yellow-flowered *S. divergens* somewhat resembles it, but is separated by its flattish opposite leaves, widest above. The very characteristic inflorescence finds its counterpart in *S. gypsicum*, but this has very different leaves, flattened, ovoid-rhomboidal, and puberulous.

DESCRIPTION.—A small, glabrous, creeping, evergreen perennial, soon forming a large mat. *Stem* round, much branched, branches ascending. *Leaves* alternate, linear-oblong to obovate, terete or flattened above, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, blunt, sessile, those of the flower-stem larger and fewer. *Flower-stem* 3 to 6 inches high, ascending, usually unbranched. *Inflorescence* of terminal and

* *Planta minima, foliis floribusque quam in typo, diametro $\frac{1}{3}$ minoribus, floribus roseoribus.*

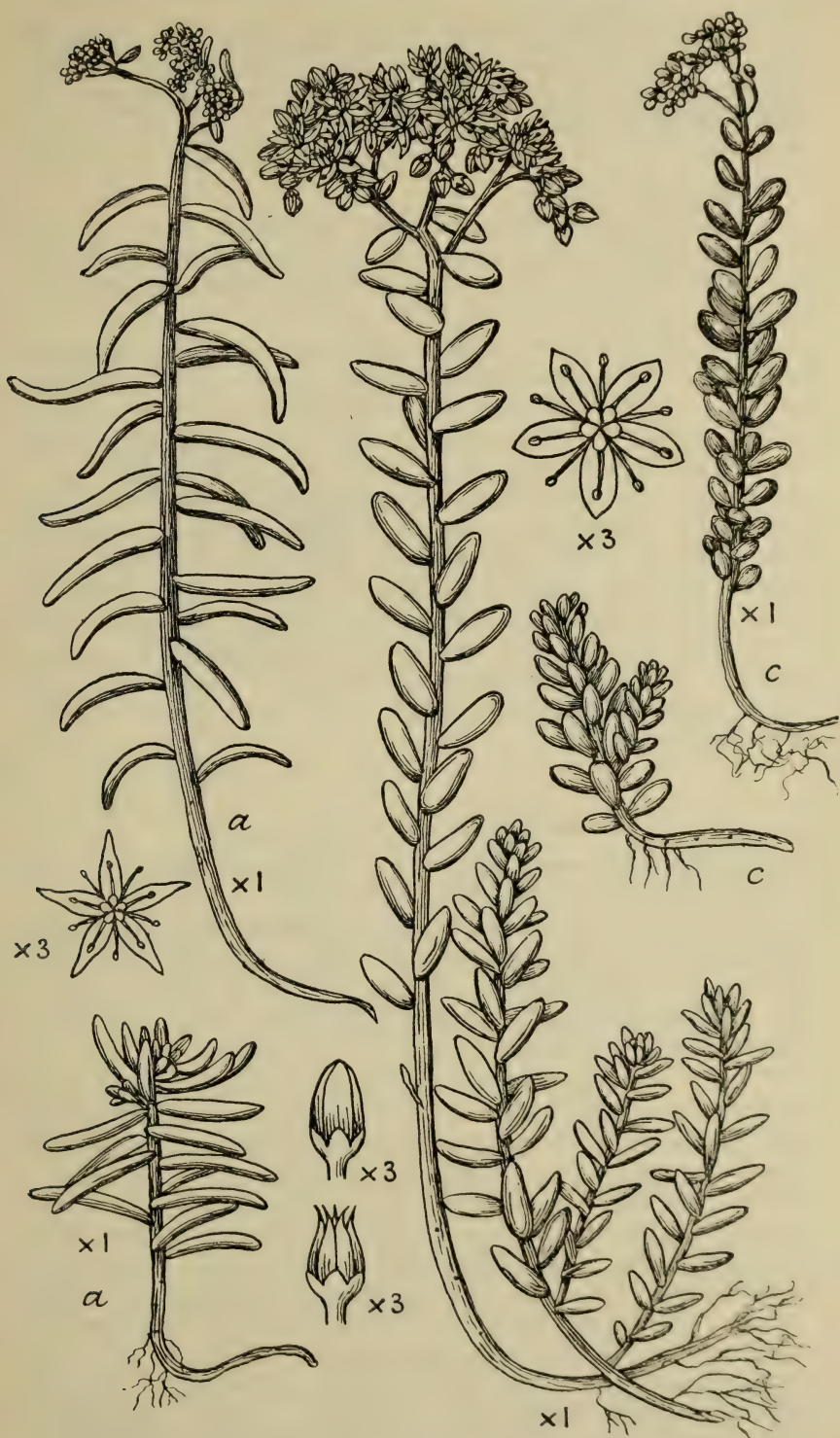


FIG. 102.—*S. album* Linn.

lateral cymose branches forming a flattish panicle 1 to 2 inches across. *Buds* ovate, blunt. *Flowers* many, $\frac{3}{8}$ inch across, exceeding the pedicels. *Calyx* cup-shaped, lobes green, ovate, blunt, equalling the tube, persistent in fruit. *Petals* lanceolate to ovate, white, blunt, 2 to 3 times the sepals. *Stamens* spreading, nearly equalling the petals, filaments white, anthers purple. *Scales* broadly spatulate, yellow. *Carpels* white, erect; erect also in fruit, when they are streaked red.

Flowers July. Hardy.

HABITAT.—Europe, Siberia, W. Asia, N. Africa.

A very common species in gardens, and quite naturalized on walls and rocks in many parts of our own islands, but seldom if ever indigenous there.

Very variable in leaf, different forms exhibiting in the garden a continuous series from linear (fig. 102, *a, a*) to almost globular (fig. 102, *c, c*). Near the former end of the series lies the type, described by Linnæus as “*foliis oblongis*,” while at the other end are the forms described under the names *Athoum* DC. = *brevifolium* Boiss., *turgidum* DC., &c. Much variation is also found as regards the shape of the leaf in cross-section, some forms being more or less flattened while others are circular. Some of the long-leaved forms have even a groove down the middle of the upper face of the leaf. But in the garden, at least, there is little use in attaching names to any of these forms, since all are linked together by intermediates. The flowers vary also, as regards both length and breadth of petal (see fig. 102), and as regards colour, most fading with a rosy tinge, but some remaining quite white.

Var. *micranthum* Bastard (pro specie).

ILLUSTRATIONS.—Sowerby, “*English Bot.*,” ed. 3, 4, pl. 529, fig. 2. Cusin and Ansberque, “*Herb. Flor. Française, Crassul.*,” tab. 21.

‘Elle differt du *S. album* parce que les feuilles des jeunes pousses sont dressées et non étalées; du *S. turgidum* par les feuilles cylindriques peu ou point renflées; de tous deux par ses fleurs de moitié plus petites.’—Bastard in litt. ex De Candolle, “*Flore Française*,” Suppl., p. 523.

I quote the original description because there has been much looseness concerning this plant, the *S. micranthum* of some authors and field botanists being only var. *brevifolium* Boissier (“*folia caulina abbreviata ovato-oblonga*”) with flowers as large as, or only slightly smaller than, those of the type. True *S. micranthum* I have seen in cultivation only from specimens collected by several correspondents in the Pyrenees. *Brevifolium* and *turgidum* seem unworthy of varietal rank; in that case the distinguishing character of *micranthum* remains: flowers half the size of those of the type. The flowers of my plants are $\frac{2}{3}$ those of the type in diameter, which is rather less than $\frac{1}{2}$ in area; the plants are very small and compact, with leaves and stems shorter than in any of the dozens of *album* forms which I have grown. The occurrence of true *micranthum* in the British Isles

appears to rest on SOWERBY's Sussex record ("Engl. Bot." *loc. cit.*, p. 53). I have not seen specimens. The diagnoses given by BABINGTON ("Man. Brit. Bot.") and HOOKER ("Students' Fl.") do not appear to represent *micranthum* Bast. at all. The Cork plant, as sent to me by several botanists, is only *brevifolium*.

Sub-var. **chloroticum** Rouy and Camus, "Flore de France," 7, 117 (fig. 103).

S. album var. *chloroticum* Lamotte, "Prodr.," 307.—Stems and leaves yellowish green. Flowers slightly greenish white.

A pretty little *micranthum* form, distinct for horticultural purposes, received from the Oxford Botanic Garden, belongs here. The total



FIG. 103.—*S. album* var. *micranthum* sub-var. *chloroticum*.

absence of red pigment throughout the stem, leaves, and flowers gives it a distinct appearance. It is more vigorously creeping than any other *micranthum* form I have seen.

f. murale.

S. murale of gardens. A form of *album* type of horticultural value, with purple foliage and pinkish flowers. Leaves, stems, and sepals purple, corolla pink on back with a red nerve, anthers pink,

scales orange, carpels turning pink, fruit red. Origin unknown to me; it has been much distributed in recent years and is a very useful plant for the rock garden.

80. *Sedum gypsicolum* Boiss. and Reut. (fig. 104).

S. gypsicolum Boissier and Reuter, "Diagnoses Plant. Nov. Hisp.," 13, 1842. Wilkomm and Lange, "Prodromus Florae Hispan.," 3, 140.

This little-known plant in flower strongly resembles *S. album*, and it has the habit of that species, but the leaves are widely different, their flattened, rather rhomboidal shape and dull greyish surface (due to fine pubescence) giving the plant an appearance quite distinct.

DESCRIPTION.—A small evergreen, creeping, puberulous perennial, forming a greyish mat, flushed red in exposure. *Stems* creeping, with many short, ascending, barren shoots, and flowering shoots 4 to 6 inches high, puberulous below, glabrous above. *Leaves* of barren shoots imbricate, arranged in about 5 spiral rows, thick, blunt, sessile, ovate-rhomboidal, $\frac{1}{4}$ inch long, puberulous, dull greyish green tinged red; those of the flower-shoots similar, more distant. *Inflorescence* corymbose, much branched, $1\frac{1}{2}$ inch across, lowest branches emerging about 2 inches below the summit. *Flowers* many, small, $\frac{1}{4}$ inch across, and, like the inflorescence, much resembling *S. album*. *Calyx* green, glabrous, only slightly fleshy, lobes triangular, blunt, equalling the tube. *Petals* white, ovate-lanceolate, acute, thrice the sepals. *Stamens* equalling the petals, anthers white, filaments purple. *Scales* minute, yellowish, broadly spatulate. *Carpels* equalling the stamens, white, erect, styles at first erect, later curving outwards.

Flowers June–July. Hardy.

HABITAT.—Spain and Portugal.

Though described over seventy years ago, I find no record of the plant in cultivation. It was collected in Spain by F. SÜNDERMANN, of Lindau, a few years ago, and came from him as "*Sedum* sp. Sierra Nevada."

81. *Sedum hirsutum* Allioni (fig. 105).

S. hirsutum Allioni, "Flor. Pedemont.," 2, 122, 1785.

ILLUSTRATIONS.—Allioni, *loc. cit.*, tab. 65, fig. 5. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 18.

A plant of about the size of *album*, or smaller, but tufted, not creeping. Distinguished by its densely hairy leaves (which are sub-terete and bluntly oblanceolate), and usually pure white, starry flowers. The only other *Sedum* in cultivation with such hairy, thick leaves is *S. dasyphyllum* var. *glanduliferum*, but in this the leaves are opposite, glaucous, shorter, and thicker, not alternate and green.

DESCRIPTION.—A small, tufted, evergreen perennial, green (reddish in exposure), hairy throughout with glandular viscidous hairs. *Barren stems* ascending, about 1 inch long, with the leaves aggregated at their tips. *Flowering stems* 2 to 3 inches high, erect, leafy, hairy. *Leaves* oblanceolate, blunt, sessile, very fleshy, hairy, especially near the tips, $\frac{3}{4}$ inch by $\frac{1}{4}$ inch, elliptic in section. *Inflorescence* few-flowered, usually of 2 branches, drooping in bud, pedicels equalling or shorter than the flowers. *Buds* ovate, acute. *Flowers* white or tinged red, $\frac{1}{2}$ inch across. *Sepals* erect, lanceolate, green, fleshy, hairy. *Petals* oval, with a short claw, apiculate, wide-spreading or reflexed, more than twice the sepals, white, with a prominent red nerve on the hairy back. *Stamens* spreading, shorter than the petals, filaments white, anthers dark purple. *Scales*

small, yellow, cuneate. *Carpels* erect, white, slightly hairy, equalling the stamens, with slightly spreading styles ; nearly erect in fruit.

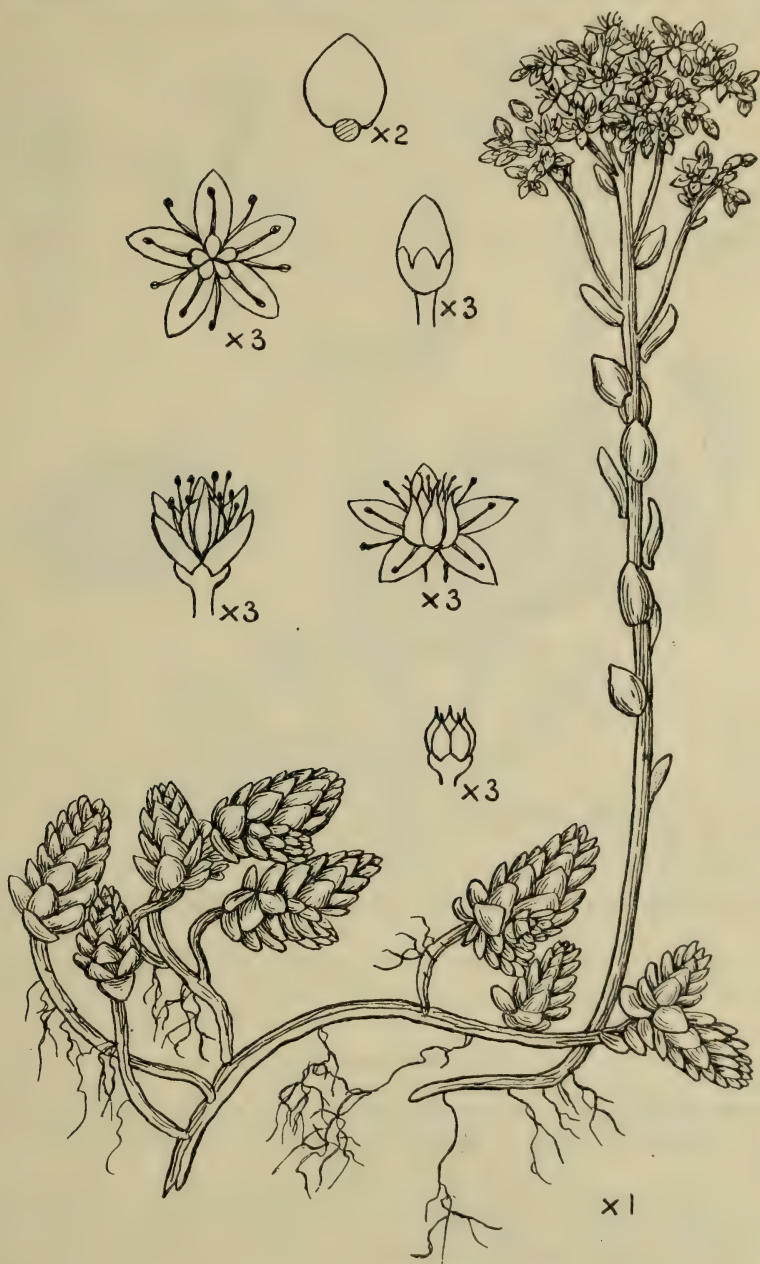


FIG. 104.—*S. gypsicolum* Boiss. and Reut.

Flowers June–July. Hardy if kept dry.

HABITAT.—South-west Europe, from Portugal to N. Italy, chiefly on the mountains.

Rare in cultivation. Mr. J. WOOD, of Boston Spa, has it (collected in the Pyrenees); and, by the kindness of correspondents,

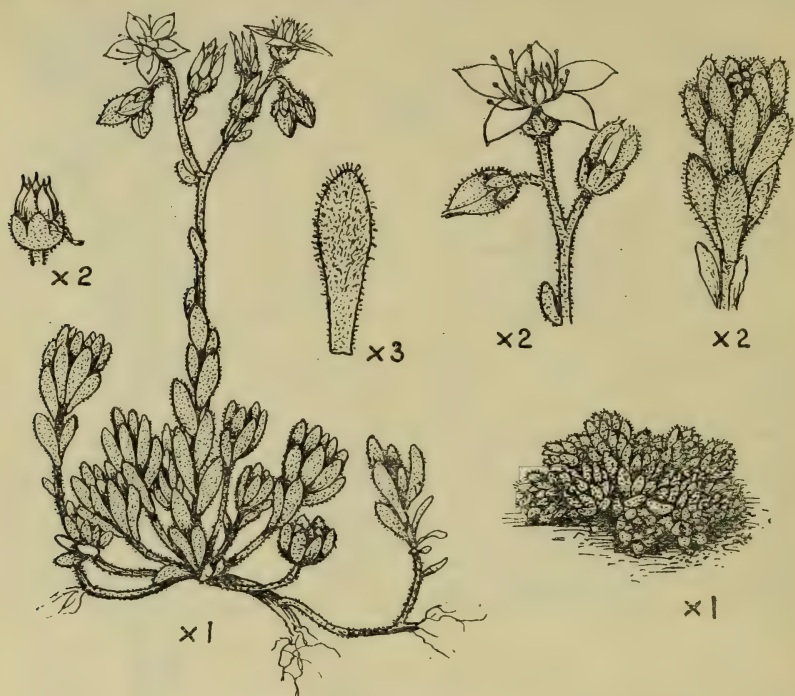


FIG. 105.—*S. hirsutum* Allioni.

I have received specimens collected in southern France, Portugal, and the Pyrenees.

Several of the floras (*e.g.* Rouy and Camus, Wilkomm and Lange) describe the flowers as purplish or red; in all the specimens I have seen they were china white.

The name has reference to the hairiness which is so conspicuous a character of the plant.

Var. *baeticum* Rouy.

Rouy in *Bull. Soc. Bot. de France*, **34**, 441, 1887 (as sub-species).

Prager in *Journ. of Bot.* **56**, 150, 1918.

More robust than the type, very glandular-hairy in all its parts, pale green in colour, flowers half as large again in diameter, petals oval rather than oblong-lanceolate, carpels broader.

The plant from which the above description is taken was collected in Southern Spain a few years ago by Miss LUCKHAM, and sent to Wisley. It agrees with ROUY's description of var. *baeticum* in all points save that in that form the flowers are a little larger, and the petals multinerved.

Its large size, pale colour, and absence of the runner-like shoots which are produced by strong plants of *S. hirsutum*, give it a distinct appearance.

82. *Sedum Lydium* Boissier (fig. 106).

S. Lydium Boissier, "Diagnoses Plant. Nov.," ser. I. **3**, 17, 1843. Boissier, "Flor. Orientalis," **2**, 782. Masters in *Gard. Chron.*, 1878, ii. 685.

A dainty little plant, especially in exposure, when its linear leaves assume a bright-red tint. Easily known among the small linear-



FIG. 106.—*S. Lydium* Boissier.

leaved, white-flowered Sedums by its dense, flat inflorescence borne on a comparatively tall stem.

DESCRIPTION.—A tiny evergreen perennial, forming a bright-green mat, mostly tinged red. *Stems* rooting below, with many ascending branches; barren shoots 1 inch high, densely leafy above; flowering shoots 2 to 4 inches, often branched below, with less-crowded similar leaves. *Leaves* terete, linear, sessile, green, reddish and minutely pimpled at the tip, $\frac{1}{4}$ inch long. *Inflorescence* compact, flattish, $\frac{3}{4}$ inch across, sparingly leafy. *Buds* ovate. *Flowers* $\frac{1}{4}$ inch across, longer than the pedicels. *Sepals* oblong, blunt, fleshy, green tipped red. *Petals* white, $1\frac{1}{2}$ times the sepals, lanceolate, rather acute, concave. *Stamens* equalling the petals, filaments white, anthers purple. *Scales* bright yellow, cuneate, notched, twice as long as broad. *Carpels* white, soon turning red, erect, shorter than the stamens; nearly erect and bright red in fruit.

Flowers June. Hardy.

HABITAT.—Asia Minor.

This tiny plant has been long in cultivation, and is frequent in gardens, sometimes under the misnomer of *S. lividum*. It is distinct and constant, and no varieties are recorded.

83. *Sedum gracile* C. A. Meyer (fig. 107).

S. gracile C. A. Meyer, "Enum. Plant. Cauc.," 151, 1831. Bossier, "Flora Orientalis," 2, 781. Hamet in *Trd. Bot. Sada* (Tiflis), 8, pt. iii. 25.

A small linear-leaved plant, having, when not in flower, some resemblance to *S. sexangulare*, but smaller and more tufted, not creeping. The flowers are white, not yellow as in *sexangulare*. Closely allied to *S. Alberti*, and almost identical in flower, but *Alberti* has a creeping habit and stems not quite so slender; the branches of the inflorescence



FIG. 107.—*S. gracile* C. A. Meyer.

are semi-erect and forked, and the flowers are slightly smaller, while *gracile*, as already stated, does not creep, and the cyme-branches are not forked, and spread almost horizontally.

DESCRIPTION.—A small evergreen glabrous perennial, bright-green in colour. *Stems* procumbent below but not creeping, much branched, terete, red, shining, clothed with old leaves save at the very base, with many ascending short, densely leafy shoots, the flowering ones $1\frac{1}{2}$ to 2 inches long, with leaves not so dense as on the barren shoots, which are shorter. *Leaves* linear-oblong, blunt, up to $\frac{5}{16}$ inch long on the flowering shoots, rather smaller on the barren shoots, flattish on face, much rounded on back, red-dotted, tips minutely papillose, sessile, prolonged into a short, blunt spur. *Inflorescence* usually of two, occasionally three or four simple patent branches with a flower in the fork, leafy throughout, the bracts identical with the leaves; branches each $\frac{1}{2}$ inch long and each bearing six or seven flowers. Buds ovate, acute. *Flowers* $\frac{5}{16}$ inch across, subsessile. *Sepals* elliptic, rather acute, fleshy, green, resembling the leaves and bracts, free almost to the base. *Petals* broadly lanceolate, thrice the sepals, acute to acuminate, patent, slightly keeled, white; on back often dotted red, with a greenish nerve. *Stamens* shorter than the petals, filaments white, anthers red-purple. *Scales* small, cuneate, retuse or emarginate, orange. *Carpels* pale

green or whitish, dotted red below on the inner face, at first erect, later slightly spreading, tapering into the slender short styles, equalling the stamens.

Flowers late June. Hardy.

HABITAT.—Caucasus region.

One of the most constant points of difference between this species and its close ally *S. Alberti* (at least so far as the plants which I have seen are concerned) is not mentioned by REGEL in describing the latter species, namely, that in *Alberti* the forked branches of the cyme bear no flowers (only leaves) between the flower which occupies the primary fork and that which occupies the secondary fork, while in *gracile* flowers are borne all the way from the primary fork to the end of the simple branches.

Rare in cultivation. I received it from REGEL and KESSELRING in Petrograd, and obtained it also at Kew (as *glaciale*) and Bremen.

84. *Sedum Alberti* Regel (fig. 108).

S. Alberti Regel in "Acta Horti Petropol.," 6, 299, 1880.

A small plant closely resembling *S. gracile* C. A. Meyer, from which it differs in its more creeping stem not clothed with old leaves and inflorescence of (mostly 3) semi-erect forked branches, devoid of flowers between the primary and secondary forks, whereas in *S. gracile* the branches (mostly 2) are unbranched and spread almost horizontally, or are recurved, and bear flowers throughout their length.

DESCRIPTION.—A small, glabrous, evergreen perennial. *Stems* procumbent, creeping, much branched, terete, red, shining, bare below, branches ascending, very leafy. *Flower-stem* $1\frac{1}{2}$ to 2 inches high, ascending, usually unbranched, with larger, less dense leaves. *Leaves* linear-oblong, blunt, up to $\frac{5}{16}$ inch long on the flower-stems, smaller on the barren shoots, flattish on face, rounded on back, red-dotted, tips minutely papillose, prolonged at base into a short blunt spur. *Inflorescence* of (usually) 3 semi-erect, leafy, forked branches, with a flower in the primary and secondary forks, but no flowers, only leaves, on the branches between these points; flowers 25–30 in all. *Buds* ovate, acute. *Flowers* subsessile, $\frac{5}{16}$ inch across. *Sepals* elliptic, rather acute, fleshy, green, resembling the leaves, free almost to the base. *Petals* broadly lanceolate, acute or acuminate, patent, thrice the sepals, white on face, often dotted red on back, with a greenish keel. *Stamens* shorter than petals, filaments white, anthers red-purple. *Scales* small, pale, reddish, cuneate, retuse or emarginate. *Carpels* pale green or whitish, dotted red near the base of the inner face, at first erect, later spreading, equalling the stamens, styles slender, short.

Flowers June. Hardy.

HABITAT.—Eastern Turkestan.

Received from Messrs. REGEL and KESSELRING of Petrograd as *S. gracile* (they also sent true *gracile*). Plants obtained under the name *S. Alberti* from the same firm and a number of British gardens were all forms of *S. album*. The plant illustrated in "Gartenflora" (tab. 1019, fig. 2) as *S. Alberti* is a totally different thing.

B. FLOWERS RED OR PURPLE.

(a) *Sub-shrub*.

Here belongs only one species, the remarkable *S. oxypetalum* of Mexico.

85. *Sedum oxypetalum* H. B. & K. (fig. 109).

S. oxypetalum Humboldt, Bonpland and Kunth, "Nov. Gen. et Sp.," 6, 45, 1823. Hemsley, "Biol. Centr. Amer., Bot.," 1, 397. "N. Amer. Flora," 22, 69.

The most tree-like of the shrubby Sedums, forming a trunk-like stem which, in old plants, is several inches thick at the base and covered with rough, brown bark. The bush tends to assume in greenhouses a rounded form and a height of 2 to 3 feet. Distinguished by its



FIG. 108.—*S. Alberti* Regel.

arborescent habit and smallish flat terminal cymes of dull red starlike flowers.

DESCRIPTION.—A glabrous, erect, sub-shrub, 2 to 3 feet high. *Stem* stout, erect, much branched, lower part very thick, bare, grey, rough. *Leaves* flat, fleshy, alternate, green, 1 to 1½ inch long, obovate-spathulate, rounded or retuse at apex, attenuate below, scarcely stalked, slightly spurred. *Cymes* terminal, lax, flat, very leafy, 1 to 2 inches across, of 3 forked branches with flowers in the forks, the bracts resembling the leaves. *Buds* lanceolate, ribbed, bluntly pointed, rather dark red. *Flowers* star-like, ½ inch across, sessile, dull red, with a strong scent of honey. *Sepals* small, green, fleshy, acute, tapering from a broad base, unequal. *Petals* linear-lanceolate, very acute, patent, 4 times the sepals, flesh-coloured, pale in the upper part. *Stamens* shorter than the petals, spreading, filaments red, anthers buff. *Scales* yellowish, cuneate, ½ the carpels. *Carpels* spreading, red, shorter than the stamens, spreading widely in fruit; styles erect, slender, yellow.

Flowers June–July (gentle heat); July–August (cold frame). Not hardy.

HABITAT.—Central Mexico.

Originally described, nearly a century ago, from specimens in Mexican gardens. It has been in cultivation in England for at least



FIG. 109.—*S. oxypetalum* H. B. and K.

forty years. In a cold frame the plant is deciduous ; in gentle heat sub-evergreen.

I received it from New York, Upsala, Paris, Berlin, La Mortola, and Kew.

The name has reference to its very acute petals.

(b) *Herbs.*

(1) Leaves flat.

Of the six species placed here, the first four belong to the well-marked group *Involucrata* of Maximowicz, confined, except for the Chinese *S. Baileyi*, to the Caucasus and Asia Minor. They are creeping perennials with opposite leaves, which are mostly comparatively large. While the species in cultivation all have red flowers, white blossoms are found in some of the other species.

The remaining two species are Mexican plants without affinity with each other or with the preceding.

spurium M.B.

Stevenianum Rouy and Camus.

stoloniferum S. T. Gmel.

rhodocarpum Rose.

proponticum Aznavour.

longipes Rose.

86. *Sedum spurium* M.B. (fig. 110).

S. spurium Marschall von Bieberstein, "Flor. Taurico-Caucas.," 1, 352, 1808. Boissier, "Flor. Orient.," 2, 778. Hamet in *Trd. Bot. Sada* (Tiflis), 8, part iii. 11.

SYNONYMS.—*S. stoloniferum* of many authors (not of S. T. Gmelin, see p. 196). *S. portulacoides* of gardens (not of Willdenow, which = *ternatum*, see p. 159). *S. oppositifolium* Sims, *Bot. Mag.*, pl. 1807.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 46. *Bot. Mag.*, loc. cit. (white form), and pl. 2370. *Revue Horticole*, 1891, 523, fig. 137. (All rather poor.) "Gartenflora," tab. 818 (good!).

Its creeping habit and opposite pairs of leaves, which are wedge-shaped below and rounded and bluntly toothed in upper half, about $\frac{3}{4}$ as broad as long, and fringed with hairs, will always distinguish this species. Its ally, *S. stoloniferum*, may be separated easily by its smaller, more rhomboidal leaves of a lighter green and not margined with hairs, slender growth, bright-red stem, and especially by its flowers, which open widely like a star and are borne on a small lax inflorescence, while those of *spurium* are larger with semi-erect petals, and form a dense, flat inflorescence (compare figures 110 and 111).

DESCRIPTION.—A sub-evergreen perennial, forming a large mat. *Stems* creeping, round, rough with annular leaf-scars, finely hairy, with many leafy ascending branches ; flowering stems reddish, about 6 inches high ; barren stems shorter with more crowded leaves. *Leaves* opposite, about 1 inch long, $\frac{3}{4}$ broad, cuneiform-obovate, crenate-serrate in upper half, cuneate in lower half, shortly stalked, fringed with hyaline hairs, imbricated on the barren shoots, dark green. *Inflorescence* a flat, dense, terminal leafy umbellate cyme, of about 4 forked branches with flowers in the forks, concave in fruit, uppermost bracts oblanceolate. *Buds* ovate-lanceolate, very acute, ribbed. *Flowers* $\frac{1}{2}$ inch long, sessile, or lowest short-stalked, normally pink. *Sepals* narrow, slightly tapering to

a blunt point, erect, fleshy, reddish-green, persistent in fruit, separate nearly to the base. *Petals* almost erect, nearly $\frac{1}{2}$ inch long, linear-lanceolate, concave, keeled, blunt, more than twice the sepals. *Stamens* shorter than the petals, filaments pink, anthers orange-red. *Scales* whitish, wide-spreading, as long as



FIG. 110.—*S. spurium* M. B.

broad. *Carpels* erect, pink or white, equalling the stamens; in fruit reddish and nearly erect with spreading beaks.

Flowers July-August. Hardy.

HABITAT.—Caucasus and Transcaucasia.

One of the commonest Sedums in cultivation; and, like most of the species widely spread in gardens, it possesses a multitude of names. A white-flowered form of it was described as a new species—*S. oppositifolium*—in 1816 by SIMS (*Bot. Mag.*, pl. 1807) and the name has persisted—though challenged more than once—until HAMET finally disposed of it in 1908 ("Révision des Sédums du Caucase," in *Trd. Bot. Sada* (Tiflis), 8, part 3). Then it became confused with *S. stolon-*

ferum S. T. Gmelin, and the latter name, being the older, was applied to it by many writers. Among the names under which it is found in cultivation at present are *altaicum*, *Braunii*, *Brownii*, *calabricum*, *coccineum*, *Comolli*, *hybridum*, *involucratum*, *lividum*, *Middendorffianum*, *mirabile*, *monregalense*, *pallidum*, *oreganum*, *populifolium*, *portulacoides*, *pulchellum*, *pulchrum*, *sarmentosum*, *undulatum*, *Wallichianum*. This list well exemplifies the appalling state of confusion that exists among the cultivated Sedums. There is little excuse in this case, for the plant varies but little, and is easily recognizable even when not in flower.

The only variation of note is in the colour of the flowers, which, normally pinkish, varies from white to deep crimson (var. *splendens* of gardens)—the latter a very fine form, which is well illustrated in Regel's "Gartenflora," tab. 818.

87. *Sedum stoloniferum* S. T. Gmelin (fig. 111).

S. stoloniferum S. T. Gmelin, "Reise," 3, 311, 1774. Boissier, "Flor. Orient.," 2, 779. Hamet in *Trd. Bot. Sada* (Tiflis), 8, part iii. 8. Not *S. stoloniferum* of Masters in *Gard. Chron.*, 1878, ii. 590, and of many other authors, which = *S. spurium*, M.B. (see p. 194).

ILLUSTRATION.—S. T. Gmelin, *loc. cit.*, tab. 35, fig. 2 (poor).

This Caucasian plant has been confused with its ally *S. spurium*, from which it is quite different. The two, which belong to a well-marked group almost confined to the Caucasus and Asia Minor, are distinct from all other cultivated Sedums in their creeping habit, broad leaves in opposite pairs, and pink flowers. The two are easily separated, and the chief differences between them are given under *S. spurium* on p. 194.

DESCRIPTION.—A semi-evergreen, creeping, glabrous perennial, forming a mat. *Roots* fibrous. *Stems* creeping, red, round, striate, rather rough, with annular leaf scars; branches many, ascending, the flowering shoots 6 inches high, the barren ones much shorter. *Leaves* opposite, numerous, bright green, loosely imbricate, rhomboid-spathulate, blunt, stalked, obscurely crenate in upper half, entire and tapering in lower half, margined with a narrow border of hyaline pimples, 1 inch long by $\frac{1}{2}$ inch broad, pale below; young leaves with fine pellucid dots; the leaves of the barren and flowering shoots similar, the latter more distant. *Inflorescence* a lax, leafy cyme of three wide-spreading branches which are often forked, with flowers in the forks. *Buds* ovate-lanceolate, acute. *Flowers* $\frac{1}{2}$ inch across, subsessile. *Sepals* linear, non-contiguous, blunt, green, separate nearly to the base. *Petals* rose, narrowly lanceolate, acute, edges incurved, wide-spreading, thrice the sepals. *Stamens* $\frac{3}{4}$ the petals, filaments rose, anthers bright red. *Scales* small, reddish, narrower above, emarginate. *Carpels* spreading, greenish pink, slightly shorter than the stamens, compressed; in fruit patent, forming, with the persistent sepals, a ten-rayed star.

Flowers June–July. Hardy.

HABITAT.—Asia Minor, Caucasus, Syria, Persia.

S. stoloniferum is rare in cultivation, though it grows very freely, and in my garden sows itself more than any other Sedum. I have seen it in the Botanic Gardens at Kew and Dresden; it came to me from Wisley as *S. involucratum* (an allied Caucasian plant not in cultivation),

FIG. III.—*S. stoloniferum* S. T. Gmelin.

from Glasnevin as *oppositifolium*, and from Mr. S. ARNOTT of Maxwelltown, Dumfries, without a name.

Its name, *stoloniferum*—"runner-bearing"—refers to the creeping stems.

88. *Sedum proponticum* Aznavour (fig. 112).

S. proponticum Aznavour in *Bulletin Soc. Bot. de France*, **44**, 169, 1897.

SYNONYM.—*S. gemmiferum* of some gardens.

ILLUSTRATION.—Rouy, "Illustr. Plant. Europ. Rar.," tab. 257.

The present species differs from all others in cultivation in its short subterranean shoots clothed with very short, very thick, white tooth-like leaves; these shoots in late autumn come to the surface and produce flat rosettes, from which the flowering stems arise in the following spring. The aerial portions of the plant are also sufficiently distinct.

DESCRIPTION.—An evergreen perennial. *Roots* fibrous. *Barren shoots* arising from the base of old stems or from points on the roots, at first subterranean, 1–2 inches long, densely clothed with very short, imbricate, very thick, colourless leaves; rising to the surface in autumn and producing a very flat winter rosette of obovate green leaves. *Flowering shoots* single, erect or eventually decumbent-ascending, arising in spring from the rosettes before-mentioned, about 6 inches high, round, unbranched, stout, nearly smooth below, rough with deflexed glands above. *Leaves* of flowering shoots opposite, flat, dark green, fleshy, the lower ones shortly stalked, obovate, tapered below, rounded at apex, entire, the upper ones smaller, sessile, sometimes alternate, broadly ovate or nearly orbicular, slightly and bluntly toothed. *Inflorescence* terminal, lax, of 2 or 3 spreading, straight, simple, scabrid branches 1–2 inches long, with a flower in the fork; occasionally a short branch is also produced from one of the highest leaf-axils. *Bracts* leaf-like, becoming very small. *Flowers* mostly sessile, the lowest shortly stalked, rosy purple, $\frac{1}{2}$ to $\frac{5}{8}$ inch across. *Buds* lanceolate, blunt, strongly ribbed. *Sepals* green, very fleshy, lanceolate, blunt. *Petals* twice the sepals, broadly lanceolate, acuminate, wide-spreading, grooved on face, strongly keeled on back, light rosy purple with a white base. *Stamens* 10, about $\frac{2}{3}$ the petals, filaments white, anthers reddish. *Scales* very short, roundish, greenish or yellowish. *Carpels* erect, equalling the stamens, lanceolate, purple, with a line of papillæ on either side, facing the adjoining carpel.

Flowers July. Half hardy.

HABITAT.—Asia Minor, opposite Constantinople.

Received from REGEL and KESSELRING of Petrograd, in 1914, and from CORREVON of Geneva, in 1916, both under the name *S. gemmiferum* (a *nomen nudum*). A very curious plant, allied to *S. Listoniae* Visiani, also from Asia Minor, which differs in its barren shoots not being subterranean, in its ciliate leaves, &c.; the latter species is not in cultivation.

S. proponticum is doubtfully hardy with us. I have lost it twice during the winter, and M. CORREVON reports that he has had to protect it at Geneva.

89. *Sedum Stevenianum* Rouy and Camus (fig. 113).

S. Stevenianum Rouy and Camus, "Flore de France," **7**, 94, 1901.

Hamet in *Trd. Bot. Sada* (Tiflis), **8**, part iii. 7.

SYNONYM.—*S. roseum* Steven in "Mém. Soc. Nat. Moscou," **3**, 263, 1812 (not of Scopoli, for which see p. 28); Boissier, "Flora Orient.," **2**, 780.

In size and habit, in the leaves broadest near the tip, and in the cup-shaped flowers, this little plant resembles *S. alpestre*; but it is smaller, the leaves are dotted with red, the petals are broader and have a red keel, the sepals are smaller, the scales larger and conspicuous.

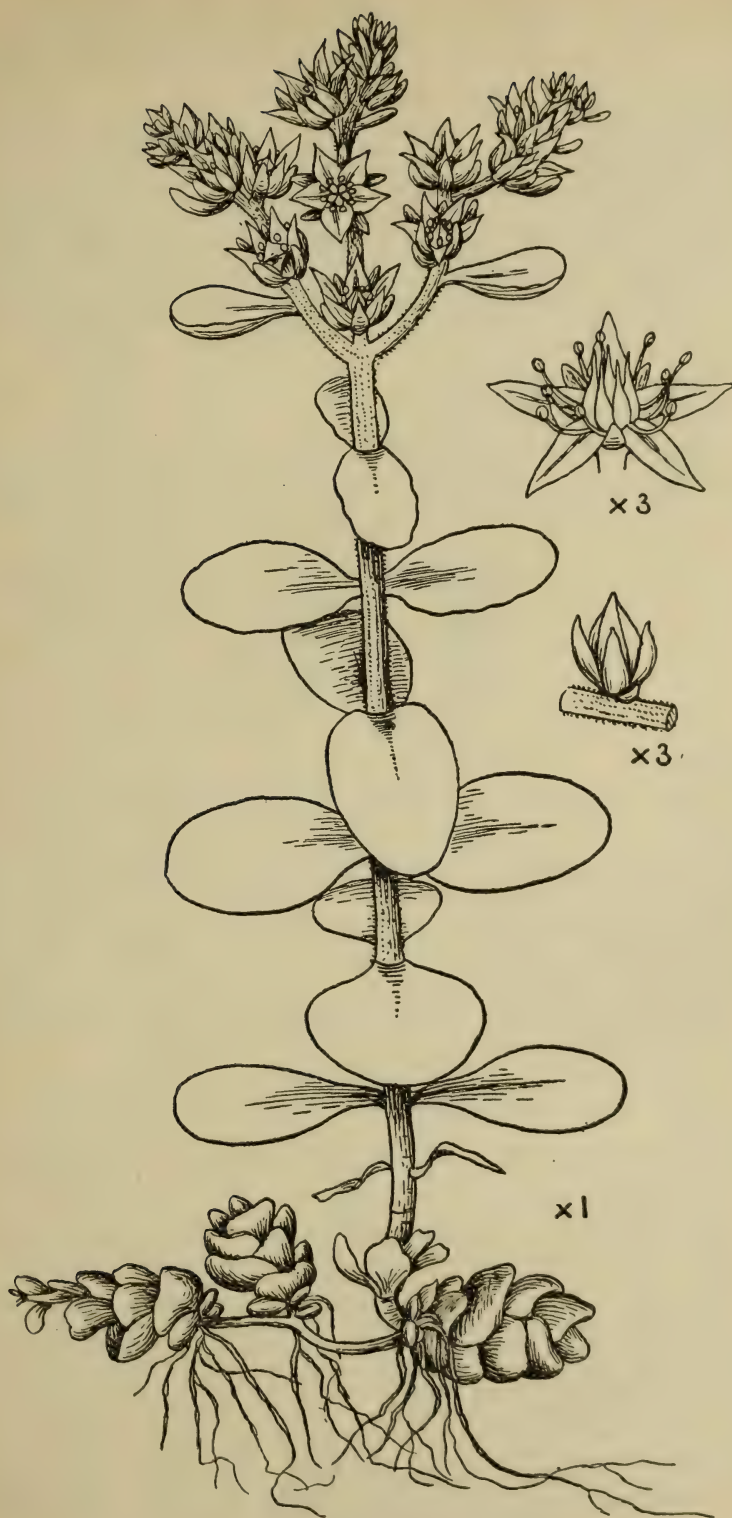


FIG. 112.—*S. proponticum* Aznavour.

In my plant the leaves faded in autumn, but remained withered on the branches, giving them a shaggy appearance.

DESCRIPTION.—A minute, glabrous, tufted perennial. *Stems* rooting below, ascending, barren shoots very short, densely leafy, flowering shoots 1–2 inches, with less dense leaves. *Leaves* opposite, sessile, entire, obovate-cuneate, blunt, very fleshy, flat on face, rounded on back, dotted with red, $\frac{1}{4}$ inch long by $\frac{1}{16}$ inch broad. *Inflorescence* a small, terminal, few-flowered, cyme. *Buds* angular. *Flowers* $\frac{1}{4}$ inch across, with pedicels about equalling the calyx. *Sepals* resembling the upper leaves, separate almost to the base. *Petals* spreading, but not widely, greenish with a reddish keel, ovate-lanceolate, blunt, $1\frac{1}{2}$ –2 times the sepals. *Stamens* equalling the sepals, filaments green, anthers pale red. *Scales* pale orange, semiorbicular, emarginate, conspicuous. *Carpels* green, erect, shorter than the stamens.

Flowers May. Hardy.

HABITAT.—Asia Minor, Caucasus.

A little plant of no horticultural value. Very rare in cultivation, but it is grown (as *S. tenellum* M. B., also a small Caucasian species, but differing in its linear terete leaves, &c.) by REGEL and KESSELING of



FIG. 113.—*S. Stevenianum* Rouy and Camus.

Petrograd, from whom I received it. Distinguished by its broad-topped leaves and cup-shaped, greenish-white flowers tinged with red.

My plant nearly died before I got it drawn, which accounts for the fragmentary character of fig. 113. Owing to the war I was not able to procure further material.

The name commemorates the original describer, who named it *S. roseum*, a name already occupied.

90. *Sedum rhodocarpum* Rose (fig. 114).

S. rhodocarpum Rose in "Contrib. U.S. Nat. Herb.," 13, 300, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 59 (photo).

A curious and very distinct species, unmistakable in its winged, triangular stem, ternate leaves, and large, greenish-red flowers.

DESCRIPTION.—A straggling, light-green evergreen perennial. *Stems* weak, smooth, green, ascending, unbranched, 6 to 9 inches high, triangular (occasionally square), with the angles winged, dying back after fruiting to near the base, young shoots arising from the lower part. *Leaves* entire, sessile, ternate (occasionally in fours), often alternate below the inflorescence, spatulate in lower part to orbicular in upper part of stem, often notched at apex, shorter than the internodes, about $\frac{3}{4}$ inch long, shortly spurred, rather thin. *Inflorescence* few-flowered, slightly branched, leafy. *Buds* oblong, blunt, greenish. *Flowers* stalked, $\frac{1}{2}$ inch across when fully expanded. *Sepals* semi-erect, very unequal, green, leaf-like, oblong-lanceolate, blunt. *Petals* greenish



FIG. 114.—*S. rhodocarpum* Rose.

flushed with red, wide-spreading, later sharply reflexed, oblong, acute, keeled, equalling or shorter than the longest sepal. *Stamens* nearly erect, equalling the petals, filaments whitish, anthers purple. *Scales* yellowish, quadrate. *Carpels* green, slightly spreading, equalling the stamens, tapering into erect styles ; the carpels become deep red in fruit.

Flowers December (gentle heat). Not hardy at Dublin.

HABITAT.—Sierra Madre, Monterey, Mexico.

Received from Washington, New York, and Edinburgh.

The name refers to the red colour assumed by the fruit.

91. *Sedum longipes* Rose (fig. 115).

S. longipes Rose in *Bulletin New York Bot. Garden*, 3, 43, 1903.

"N. Amer. Flora," 22, 70.

A curious *Sedum*, easily recognized by its long, low-arching, leafy branches rooting at intervals, small bright-green leaves very convex above, and small few reddish flowers with large forked scales.

DESCRIPTION.—Glabrous, bright-green, perennial. *Roots* fibrous. *Stems* smooth, round, green mottled red, long-arching or decumbent, rooting at intervals, often with purple aerial roots, branching at the rooting points or towards the ends, ends of branches erect, slender, bearing terminal flowers. *Leaves* alternate, rather distant, very fleshy, sessile, slightly spurred, obovate or spatulate, entire, very blunt, reflexed, very convex above, flattish below, up to $\frac{3}{8}$ inch long by $\frac{3}{16}$ broad, diminishing at ends of shoots to $\frac{1}{8}$ long. *Inflorescence* of several (usually 2) terminal flowers on long filiform pedicels. *Buds* broadly ellipsoid, blunt. *Flowers* reddish, few, inconspicuous, $\frac{5}{16}$ inch across. *Sepals* green, fleshy, wide-spreading, ovate-lanceolate, blunt, with a blunt spur. *Petals* ovate, blunt, patent, red in upper part, becoming silvery white near base. *Stamens* wide-spreading, nearly equalling the petals, filaments whitish, anthers orange. *Scales* very large, spreading, tips reflexed, coloured like the petals, forked in upper part, the branches widely divergent, each with 2 or 3 reflexed teeth. *Carpels* short, erect, green ; styles short, reddish, with spreading tips.

Flowers January (gentle heat). Very sensitive to frost.

HABITAT.—Sierra de Tepoxtlan, Mexico.

A very distinct plant, remarkable both on account of its habit and its flowers. Planted where frost is excluded, it soon forms a tangled mass several feet across, the shoots arching for half a foot or so, then rooting and branching, and the branches arching similarly. The shoots of the following year arise from ovoid buds produced near the base of the stem, or at other points of the stem, especially where roots are formed. In a cold frame the stems get killed off by frost, the buds alone remaining (as often happens with *S. sarmentosum* in the open). The young leaves have a pimpled surface ; the hypogynous scales are very remarkable and abnormal for the genus. Flowers solitary according to ROSE ; in pairs in my plants ; in clusters of as many as six in a specimen of PRINGLE'S in British Museum.

The large forked and toothed scales are very unusual in the genus. One of them is shown in the figure (fig. 115, *a*) where the carpel is foreshortened to show the full size of the scale.

In cultivation in Britain the flowers are very pale, no doubt owing to the weakness of the winter sunlight ; but in dried Mexican specimens they are of a deep purple.

Received from New York and Edinburgh.

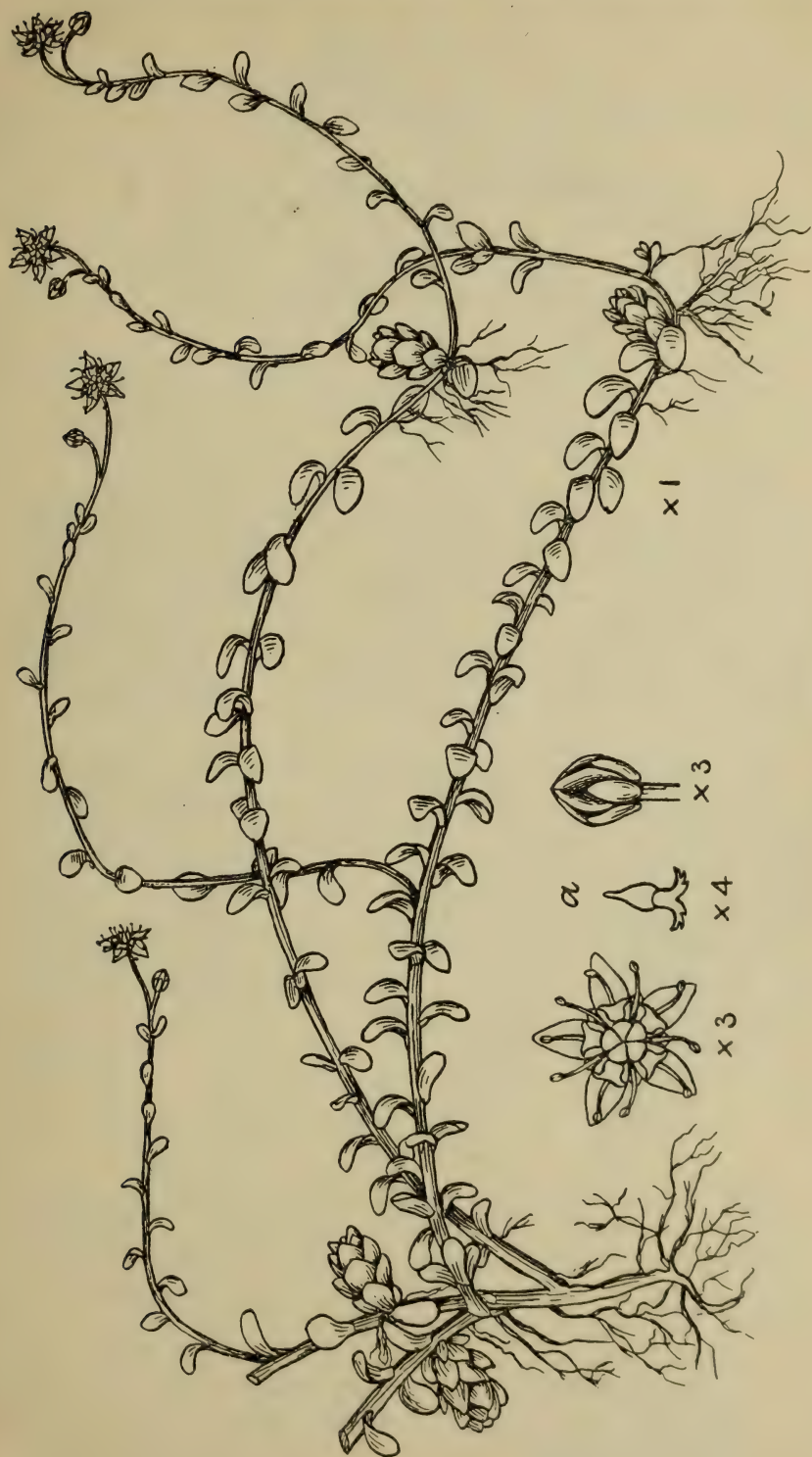


FIG. 115.—*S. longipes* Rose.

(2) Leaves terete.

The only red-flowered *Sedum* with terete leaves outside the *Rhodiola* section is the pretty North American *S. pulchellum*.

92. *Sedum pulchellum* Michaux (fig. 116).

S. pulchellum Michaux, "Flora Bor. Amer.," 1, 277, 1803. "N. Amer. Flora," 22, 63. Masters in *Gard. Chron.*, 1878, ii. 684.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 6223. *Gard. Chron.*, 1874, ii. fig. 111; repeated, 1878, ii. fig. 114.

A handsome species, known at once by its pinkish, 4-parted flowers densely set on radiating recurved branches at the summit of the stem. The leaves are fresh green and linear, with a forked spur at the base, and the plant does not creep.

DESCRIPTION.—Evergreen, perennial, forming a bright-green tuft. *Stems* erect or trailing, not creeping, all eventually flowering, smooth, round, slender, red, bare and branched below. *Leaves* crowded, green, ascending, linear, terete, blunt, about $\frac{5}{8}$ inch long, produced below into a forked spur. *Inflorescence* 3 to 4 inches across, of 3 to 5 recurved simple leafy branches with a 5-parted flower in the fork. *Flowers* 4-parted (except the central one), sessile, rosy purple, $\frac{1}{2}$ inch across. *Buds* ovate, blunt, strongly 4-angled. *Sepals* green, fleshy, lanceolate, blunt, separate nearly to the base. *Petals* rosy purple, lanceolate, acute, keeled, twice the sepals. *Stamens* shorter than the petals, filaments rose, anthers red, oblong. *Scales* small, whitish. *Carpels* slender, rose, equalling the stamens, erect, later spreading, tapering into the long styles.

Flowers July–August. Hardy.

HABITAT.—United States, Missouri to Virginia and Texas.

One of the best *Sedums* in cultivation, its large, claw-like inflorescences of rosy-purple flowers being produced abundantly and for a long period. The plant is remarkable in its genus for its love of a damp habitat; the finest plants I have seen have been on the edge of water, and in my own garden, where there is a light, porous soil, I have to grow it in a pot plunged in a tub. The plant has been long known in gardens, and is generally correctly named; it is unmistakable.

Found in most collections. The name refers to its pleasing appearance.

C. FLOWERS YELLOW.

(a) *Sub-shrubs*.

Here belongs a characteristic group of Mexican *Sedums*, most of which are in cultivation. *S. nutans*, the most massive of all *Sedums*, has been placed by ROSE in a separate genus, *Cremnophila*, but its flowers present no distinct generic character. *S. praealtum*, *dendroideum*, and *confusum* form a compact closely related group.

nutans Rose.

amecamecanum Praeger.

dendroideum Moç. and Sessé.

pachyphyllum Rose.

praealtum DC.

Treleasei Rose.

confusum Hemsley.

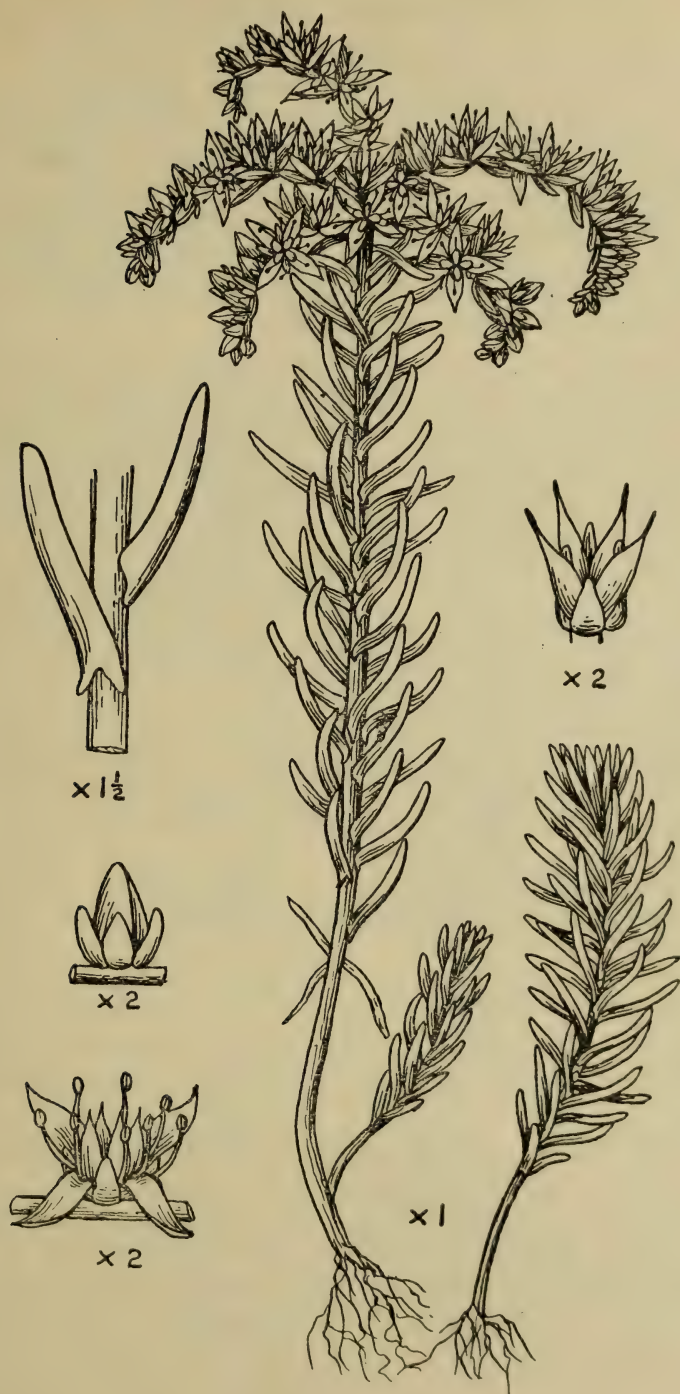


FIG. 116.—*S. pulchellum* Michaux.

93. *Sedum nutans* Rose (fig. 117).

S. nutans Rose in *Bull. New York Bot. Garden*, **3**, 43, 1903.

SYNONYM.—*Cremnophila nutans* Rose in "N. Amer. Flora," **22**, 56, 1905.

A remarkably massive plant with inflorescence of a type rare in *Sedum*—an elongated, compact panicle. Easily recognized by this character, by its yellow-green flowers, and very large leaves over half-an-inch thick. Its peculiar characters caused Dr. ROSE to place it in a separate genus, but as most of these features can be matched in one or another species of *Sedum*, it seems best to leave it in that genus where Dr. ROSE originally placed it.

DESCRIPTION.—A massive, very succulent, glabrous, evergreen perennial. *Stem* erect (in nature pendent on cliffs), $\frac{1}{2}$ – $\frac{3}{4}$ inch thick, branched, round, smooth save for leaf-scars, bare below. *Leaves* aggregated at top of branches, up to 3 by 2 by $\frac{5}{8}$ inch or more, sessile, oblong-ovate to trapezoidal, blunt, dark green, smooth, flat above, rather rounded below, crowded. *Flower-stem* axillary, ascending, 6 to 8 inches long, leafy, leaves alternate, almost obovoid, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, smaller upwards. *Inflorescence* an elongated panicle about 3 inches long by $1\frac{1}{2}$ inches wide; branches deflexed, leafy, with linear-obovate bracts, the lower branches with up to 8 flowers; panicle nodding. *Buds* obovate, very blunt. *Flowers* greenish-yellow, cup-shaped, 5- (occasionally 6-) parted. *Sepals* ascending, linear to linear-obovate, very fleshy, flattish on face, rounded on back, pale green, unequal, as long as the petals. *Petals* lanceolate, apiculate, ascending or patent, greenish yellow, separate to the base. *Stamens* equalling the petals, slightly spreading, filaments pale green, anthers yellow. *Scales* cuneate-oblong, rather longer than broad, upper part orange-scarlet. *Carpels* whitish, erect, with green slender spreading styles.

Flowers March (gentle heat). Not hardy.

HABITAT.—Cliffs at Tepoxtlan, Mexico.

Received from Edinburgh; seen also at Kew.

The name has reference to the nodding habit of the inflorescence, a character very unusual in *Sedum*.

Dr. ROSE describes the petals as bright yellow; but in the Edinburgh plant (which came from Washington) they are greenish yellow.

94. *Sedum dendroideum* Moç. and Sessé (fig. 118, 119b).

S. dendroideum Moç. and Sessé ex De Candolle "Prodromus," **3**, 409, 1828. Hemsley, "Biol. Centr. Amer., Botany," **1**, 394. "N. Amer. Flora," **22**, 69.

ILLUSTRATION.—De Candolle, "Mémoire Crassul.," pl. 9.

This species, with *S. praealtum* and *S. confusum*, form a closely related group much confused in gardens, and usually misnamed. The common plant of English cultivation, often seen in cottage windows, and, when named, usually called *dendroideum*, is *S. praealtum*. *S. confusum* is rarer in gardens, and is also usually labelled *dendroideum* when named at all. *S. dendroideum* itself I have only met with as an unnamed plant ($\frac{0}{841}$) sent from Washington. I have not succeeded in flowering it, but the leaf characters appear to identify it satisfactorily. In America, on the other hand, *dendroideum* appears to

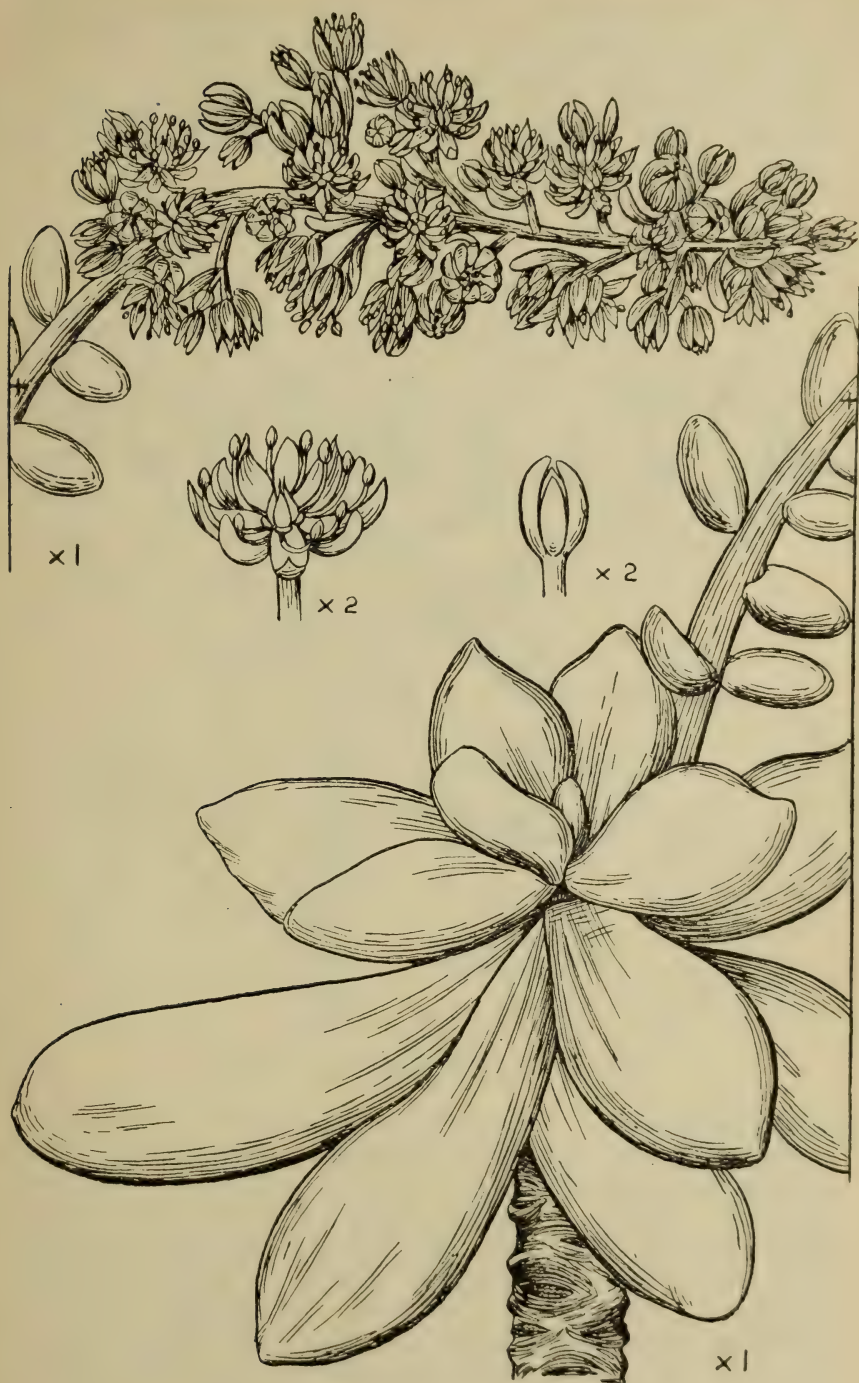


FIG. 117.—*S. nutans* Rose.

be the species best known. In the "N. American Flora," ROSE's descriptions of *praealtum* and *confusum* are evidently copied from HEMSLEY, "Biol. Centr. Americana," and he even says of the former, "a very doubtful species." His description of *dendroideum*, on the other hand, is clearly original, though whether based on living or dried material does not appear.

The descriptions are not sufficiently full to point to satisfactory distinguishing characters of flower between this species and the other two, but it appears easily separated by its leaves (see fig. 119), which

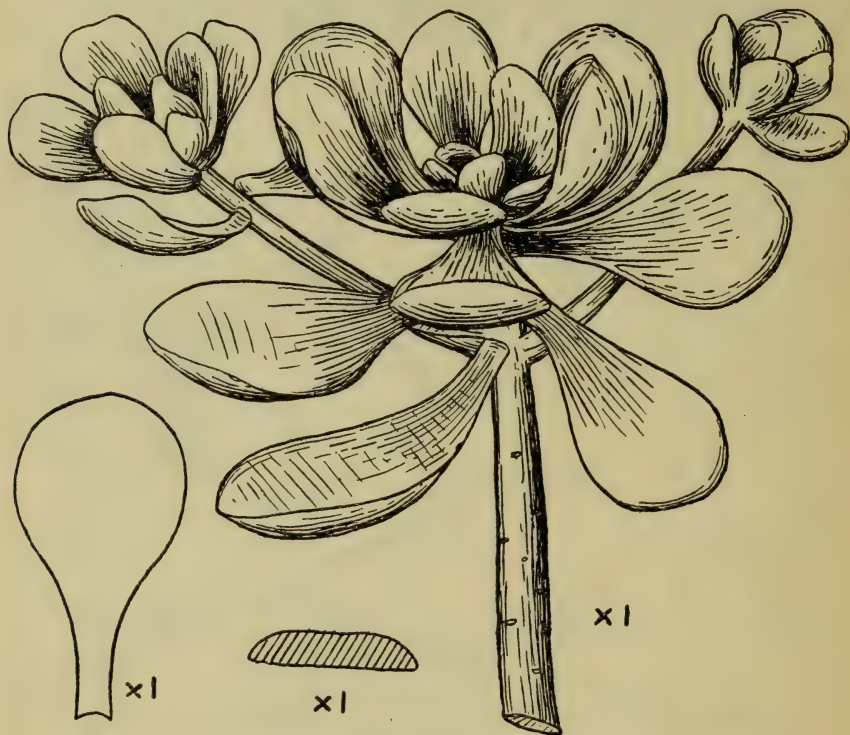


FIG. 118.—*S. dendroideum* Moç. and Sessé.

are distinctly stalked and have a nearly orbicular lamina. In my plant, also, they have a whitish margin when young (due to a waxy secretion) and a purplish margin when old, while in the two other species the leaves are wholly green; the leaf also is of much firmer texture than in *praealtum* or *confusum*, and the stem is stiff and erect, with few ascending branches, while in the others it branches frequently and soon forms a low bush. The petals, described as lanceolate, appear to be broader than those of *praealtum*, narrower than those of *confusum*. The inflorescence is large like that of *praealtum*, not congested as in *confusum*. In the following description the stem and leaf characters are taken mainly from my living plant, the remainder from DE CANDOLLE, HEMSLEY, and ROSE. To judge

from DE CANDOLLE'S figure the inflorescence is very like that of *S. praealtum*.

DESCRIPTION.—A sub-shrubby evergreen perennial. *Stem* erect, 1 to 2 feet high, up to $\frac{1}{2}$ inch thick, with few ascending branches. *Leaves* aggregated near the apices of the branches, rounded on face, flat on back, $1\frac{1}{2}$ inch long, $\frac{7}{8}$ inch broad, $\frac{1}{8}$ inch thick, stalked; petiole about $\frac{1}{2}$ inch long, $\frac{3}{16}$ inch broad, lamina spatulate-

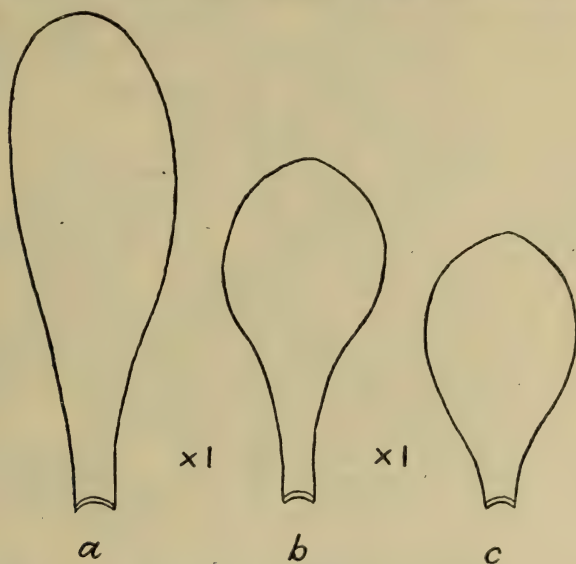


FIG. 119.—Leaves of (a) *S. praealtum*, (b) *S. dendroideum*, (c) *S. confusum*.

orbicular, cuneate below, semicircular above; margin entire, often white with wax when young, purple when old. *Inflorescence* terminal, cymose-paniculate, large, about 2 to 6 inches long by 4 inches across. *Flowers* bright yellow, nearly $\frac{1}{2}$ inch across. *Sepals* ovate, obtuse. *Petals* lanceolate, acute, $\frac{1}{4}$ inch long. *Scales* small, truncate, slightly retuse. *Carpels* spreading in fruit.

Not hardy.

HABITAT.—Central Mexico.

Derives its name from its tree-like habit (Greek *dendron*, a tree).

95. *Sedum praealtum* DC. (fig. 119a, 120).

S. praealtum De Candolle, "Plant. Rar. Genève," 10, 21, 1847. Hemsley, "Biol. Centr. Amer., Bot.," 1, 398. "N. Amer. Flora," 22, 70.

This is the most widely spread in gardens of the shrubby Sedums of the *dendroideum* group, and is mostly grown under that name. Of garden Sedums it is most likely to be confused with *S. confusum*, a smaller plant with shorter leaves and smaller inflorescence; the differences between the two are particularized on p. 211. From its ally, *S. dendroideum*, it may be distinguished by its leaves not distinctly stalked and lamina more oblong (not suborbicular) (see fig. 119) and its more branched bushy habit.

DESCRIPTION.—A much-branched, glabrous, evergreen shrub, forming a low bush, 1 to 2 feet high, and equally wide. *Stems* round, smooth, green, woody



FIG. 120.—*S. praealtum* DC.

below, leafy near the tips ; branches wide-spreading. *Leaves* alternate, set at right angles to the stem, green and shining, flat, very fleshy, lanceolate-spathulate, entire, rounded or bluntly pointed at apex, narrowed below, sessile, flat on face, rather rounded on back, often curving upward, 2 to $2\frac{1}{2}$ inches long, $\frac{1}{2}$ to $\frac{3}{4}$ inch broad. *Inflorescence* a much-branched, lax, paniced cyme, 3 to 4 inches long and broad. *Buds* ovate, rather acute, $\frac{3}{8}$ inch long. *Flowers* subsessile, $\frac{3}{4}$ inch across. *Sepals* green, fleshy, blunt, ovate-lanceolate, twice as long as broad. *Petals* bright-yellow, patent, narrowly lanceolate, very acute, 4 to 5 times the sepals. *Stamens* spreading, yellow, $\frac{3}{4}$ the petals. *Scales* minute, yellow. *Carpels* yellow, erect, later spreading, equalling the stamens, tapering into the styles, spreading in fruit.

Flowers May-June (in the open). Hardy in the milder parts of the British Isles.

HABITAT.—Mexico. Described by DE CANDOLLE over seventy years ago from cultivated specimens, and still widely grown in Europe. It is a common cottage-window plant in Ireland and parts of England and Scotland. In gardens it is usually called *S. dendroideum* ; sometimes *S. confusum* or *S. giganteum*. Though now widespread in Europe, it appears to have been lost sight of in America. Dr. ROSE (*loc. cit.*) merely repeats HEMSLEY'S description, and doubts the validity of the species. It is, however, a well-marked and quite distinct plant.

The name (*praealtus* = very high) refers to its tall growth, which HEMSLEY sets down at 5 to 6 feet ; but in these countries it never attains even half that height.

96. *Sedum confusum* Hemsley (fig. 119c, 121).

S. confusum Hemsley, "Diagnoses Plant. Nov.," 1, 10, 1878. Hemsley, "Biol. Centr. Amer., Bot.," 1, 393. "N. Amer. Flora," 22, 70.

ILLUSTRATION.—Saunders' "Refug. Botan.," 5, pl. 337.

SYNONYM.—*S. spathulifolium* Baker in Saunders' "Refug. Botan.," *loc. cit.* (not of Hooker, see p. 238).

The third member of the well-marked *dendroideum* group of shrubby Mexican Sedums. *S. confusum* is the smallest of the three, and differs from *praealtum* in its smaller, broader leaves, 1 to $1\frac{1}{2}$ inches (not 2 to $2\frac{1}{2}$ inches) long, twice (not 3 to 4 times) as long as broad, semi-elliptic (not pointed) at the apex, inflorescence smaller and denser (about 2 inches instead of 4 inches long and broad), petals broader (3, not 4 times as long as broad). *S. dendroideum* differs in its taller stiffer growth, stalked leaves, &c. (see figs. 118, 119).

DESCRIPTION.—A glabrous, evergreen, shrubby perennial, forming a bush a foot high and wide. *Stem* woody below, round, smooth, often reddish, much branched ; branches ascending. *Leaves* alternate, longer than the internodes, flat, fleshy, bright green, shining, obovate-spathulate, 1 to $1\frac{1}{2}$ inches long, usually semi-elliptic at apex (sometimes with a very blunt point), cuneate below, sessile, face with a median V-shaped groove with well-marked edges near the base, back paler with a slightly raised median ridge. *Inflorescence* terminal, compact, $1\frac{1}{2}$ to 2 inches long and broad, cymose-paniculate ; bracts linear, very fleshy, few. *Buds* ovate, bluntly pointed. *Flowers* yellow, $\frac{1}{2}$ to $\frac{3}{4}$ inch across, on very short pedicels ($\frac{1}{8}$ to $\frac{1}{4}$ inch). *Sepals* yellowish green, very fleshy, ovate, blunt, nearly twice as long as broad, limb exceeding the tube. *Petals* patent or reflexed, ovate-lanceolate, acute, channelled, 3 times as long as broad. *Stamens* yellow, $\frac{3}{4}$ the petals. *Scales* small, roundish, notched, yellow. *Carpels* lanceolate, greenish yellow, slightly spreading, with short erect styles ; wide-spreading in fruit.



FIG. 121.—*S. confusum* Hemsley.

Flowers April (cold frame); May–June (in the open). Hardy in all mild areas in the British Isles.

HABITAT.—Not certainly known, but undoubtedly Mexico. Described by HEMSLEY forty years ago from English garden specimens labelled *S. spathulifolium*, and still found in English gardens. I have had it from nearly a dozen different sources, labelled *confusum*, *dendroideum*, or *praealtum*. Apparently not in cultivation in America, nor as yet re-collected in Mexico.

It is the hardiest of the *dendroideum* group, and survived the severest Dublin winters which killed out *S. praealtum* almost entirely.

A plant received from La Mortola as “sp. Mexico” is a large form, with longer branches, and leaves $1\frac{1}{2}$ to 2 inches long and proportionately broad. In flower it is identical with the type. Otherwise I have seen no variation in the species.

97. *Sedum amecamecanum* Praeger (fig. 122).

S. amecamecanum Praeger in *Journ. of Bot.*, 54, 44, 1917.

A member of the sub-shrubby, flat-leaved section of Mexican Sedums, easily distinguished from the *dendroideum* group (*dendroideum*, *praealtum*, *confusum*) by its much smaller size and pale buff-yellow flowers; and from the rest of the section by its oblanceolate (not spatulate) leaves, &c.

DESCRIPTION.—A small, erect, glabrous, evergreen sub-shrub, 6 inches or more in height. *Stem* smooth, round, with wide-spreading branches, bare below, reddish, marked with small greyish leaf-scars. *Leaves* rather crowded, flat, fleshy, green, patent or reflexed, sessile, with a very short truncate spur, oblanceolate, bluntly pointed, $\frac{3}{4}$ inch long by $\frac{1}{4}$ inch broad. *Flowering shoots* not different from the barren ones. *Inflorescence* terminal, rather dense, roundish, $\frac{3}{4}$ to 1 inch in length and breadth, leafy, uppermost bracts resembling the sepals. *Buds* lanceolate to oblong, blunt, ribbed. *Flowers* $\frac{3}{8}$ inch across, of a palish buff-yellow. *Sepals* unequal, blunt, linear or club-shaped, very fleshy, green, wide-spreading, shortly spurred, separate to the base. *Petals* broadly lanceolate, wide-spreading, acute, $\frac{1}{2}$ longer than the longest sepal. *Stamens* yellow, spreading, $\frac{2}{3}$ the petals. *Scales* short, squarish, emarginate, deep orange above with a whitish base. *Carpels* erect, tapering, equalling the stamens, greenish yellow, styles slender, slightly spreading, orange-yellow.

Flowers May (cold frame). Not hardy at Dublin, but hardy at Rostrevor, a very mild spot.

HABITAT.—Amecameca, Mexico.

Sent to Wisley from Washington unnamed under the number $\frac{06}{10}$, having been collected by C. A. PURPUS in 1906 (No. 108).

98. *Sedum pachyphyllum* Rose (fig. 123).

S. pachyphyllum Rose in “Contrib. U.S. Nat. Herb.,” 13, 299, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 58 (photo).

A large, very thick-leaved Sedum most resembling *S. allantoides* and to a less degree *S. Treleasei*; from the latter it can be at once separated by its terete, not flat, leaves. In flower, its dense, flattish

inflorescence of yellow flowers is very different from the loose white panicles of *S. allantoides*. The vegetative parts and habit of the



FIG. 122.—*S. amecamecanum* Praeger.

two are rather similar, but *S. pachyphyllum* is much less glaucous, the leaves are tipped with red, and the shoot ends in many young leaves. *S. allantoides* is very glaucous, without any flushing of red, and the young leaves are singularly few.

DESCRIPTION.—A large, very fleshy, rather shrubby, evergreen perennial. Stems woody and bare below, sprawling and sometimes rooting, round, smooth,

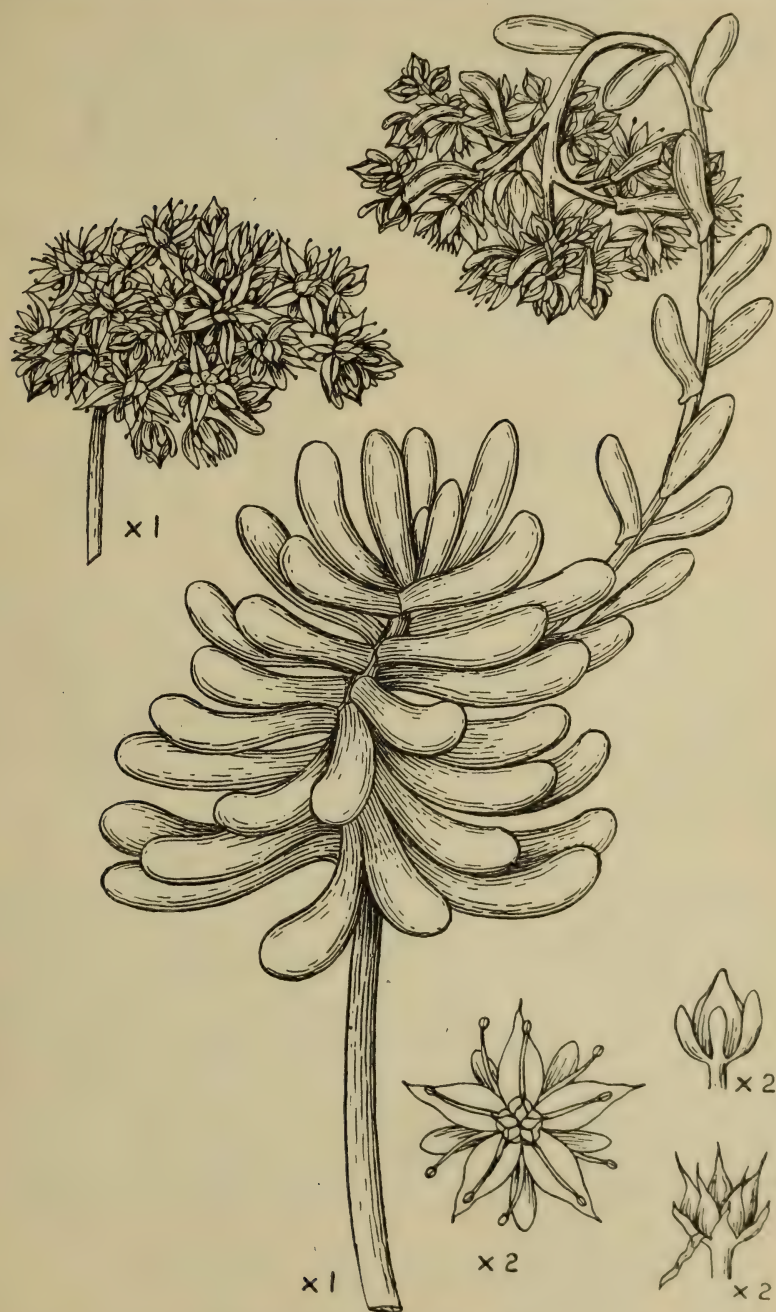


FIG. 123.—*S. pachyphyllum* Rose.

with many ascending or spreading branches up to a foot high. Leaves alternate, crowded, terete, slightly broader above, $1\frac{1}{2}$ inch long by $\frac{1}{4}$ inch thick, very blunt,

sessile, with a short adpressed spur, set at right angles to the stem and curved upwards, often in five spiral rows, slightly glaucous, tipped red. *Flower-stems* axillary, about 4 inches long, slender, with leaves similar to those of the barren stems, but spur more pronounced. *Inflorescence* cymose, dense, flattish, $1\frac{1}{2}$ to 2 inches across, often pendent, uppermost bracts small, linear. *Buds* greenish, strongly ribbed, ovate, acute. *Flowers* $\frac{5}{8}$ inch across, pedicels short, slender. *Sepals* spreading, linear or club-shaped, terete, blunt, unequal, pale green. *Petals* wide-spreading or slightly reflexed, ovate-lanceolate, bright yellow, slightly exceeding the longest sepal. *Stamens* wide-spreading, yellow, equalling the petals. *Scales* very short, twice as broad as long, yellow. *Carpels* erect, later slightly spreading, greenish yellow, shorter than the stamens, styles slender.

Flowers January (Washington), April (Glasnevin, gentle heat). Not hardy.

HABITAT.—Oaxaca, Mexico.

Received from Washington, Kew, and Edinburgh.

Its name *pachyphyllum* (= thick leaf) emphasizes one of its leading characters.

99. *Sedum Treleasei* Rose (fig. 124).

S. Treleasei Rose in "Contrib. U.S. Nat. Herb.," 13, 300, 1911.

ILLUSTRATION.—*Loc. cit.*; pl. 60 (photo.).

This striking plant belongs to the massive, fleshy-leaved section of the Mexican Sedums. In growth and leaf it comes near *S. Adolphi* Hamet, but in the latter the leaves are only half as thick, of a firmer texture, and in colour yellowish flushed with red, while in *S. Treleasei* they are densely glaucous-pruinose. The flowers of *S. Treleasei* are bright yellow, of *S. Adolphi* white. In inflorescence and flower *S. Treleasei* much resembles *S. pachyphyllum* Rose, but that species has club-shaped, terete leaves like those of *S. allantoides* Rose.

DESCRIPTION.—A very fleshy, glaucous, evergreen perennial. *Roots* fibrous. *Stems* at first erect, later ascending or sprawling, branched, smooth, round, $\frac{1}{4}$ inch or more thick, ultimately rather woody. *Leaves* alternate, rather crowded, sessile, set at right angles to the stem, curved upwards, oblong-obovate, bluntly pointed at apex, broad at base, almost flat on face, semicircular in section, of a rather soft fleshiness, very glaucous-pruinose, about $1\frac{1}{4}$ inch by $\frac{5}{8}$ inch by $\frac{3}{8}$ inch. *Flowering branch* lateral, from one of the uppermost leaf-axils, slender, erect, pinkish, 3–5 inches long, clothed with a few (6 to 12) small, oblong leaves. *Inflorescence* erect or nodding, cymose, of several forked branches, compact, subglobular, 1 to $1\frac{1}{2}$ inch across, bracts few, minute. *Flowers* on short pedicels, $\frac{1}{2}$ inch across, bright yellow. *Buds* obovate, strongly ribbed, greenish. *Sepals* very unequal, linear-lanceolate, acute, very fleshy, glabrous, greenish. *Petals* about twice the average sepal, ovate-lanceolate, acute, $\frac{1}{4}$ inch long, patent or reflexed. *Stamens* equalling the petals, spreading, bright yellow, filaments tapering. *Scales* small, quadrate, slightly longer than broad, lightly emarginate, orange. *Carpels* erect, contracting rather abruptly into long, slightly divergent styles, which equal the stamens.

Flowers April (Glasnevin, gentle heat). Not hardy.

HABITAT.—Mexico.

My plants came from Washington, New York, and Edinburgh.

Named after Dr. WILLIAM TRELEASE, the first collector of the plant.

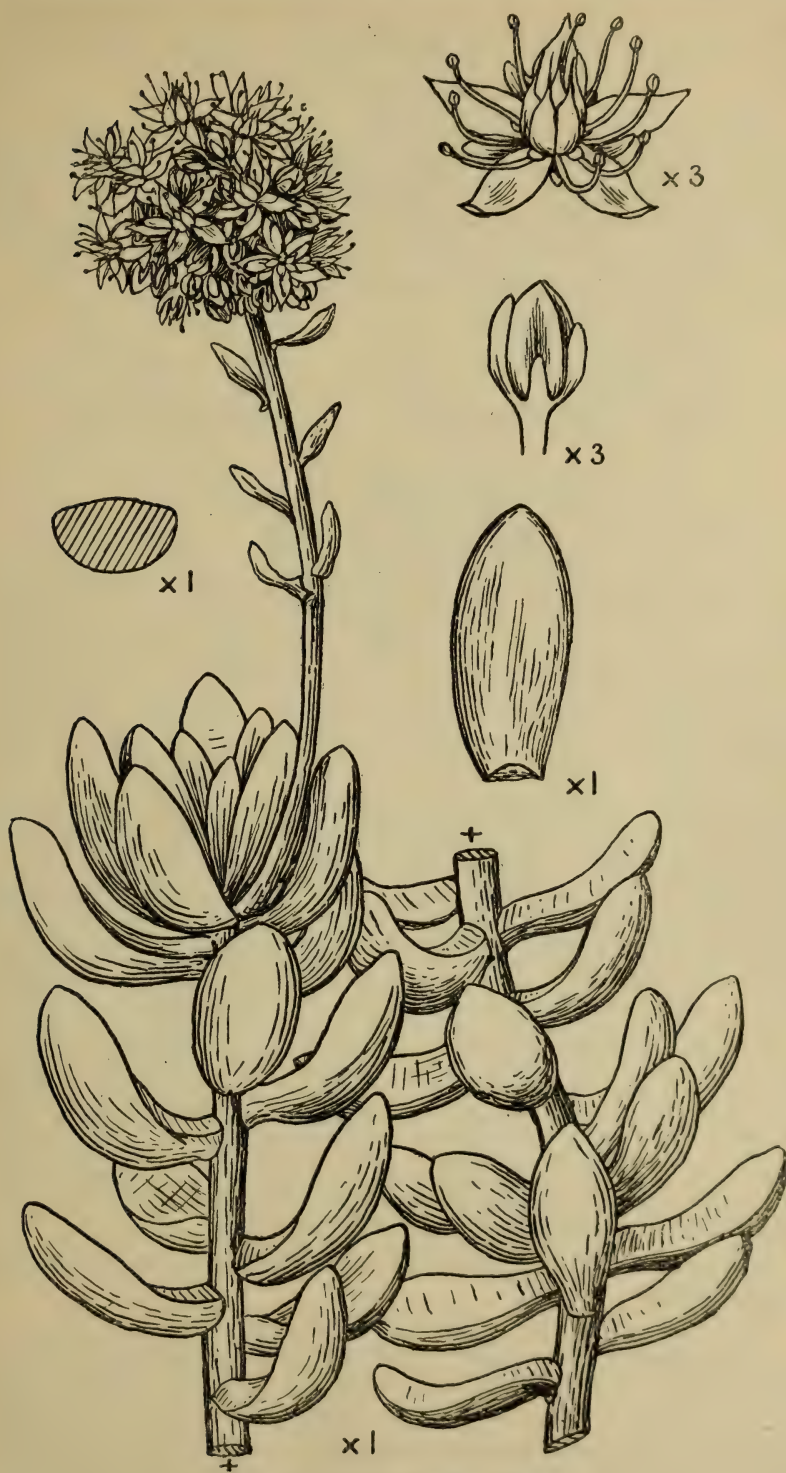


FIG. 124.—*S. Treleasei* Rose.

(b) Herbs.

(1) Leaves opposite or whorled.

Eight of the cultivated Sedums fall in here, belonging either to N. America or E. Asia. The opposite-leaved *S. rubroglaucum* and *S. divergens* have many points of resemblance, and the three ternate-leaved species, *S. Chauveaudi*, *sarmentosum*, and *lineare*, from the Far East, are allied. *S. mexicanum* is exceptional among the Seda Genuina in having many-leaved whorls.

rubroglaucum Praeger
divergens S. Wats.
Stahlii Solms
Zentaro-Tashiroi Makino

Chauveaudi Hamet
sarmentosum Bunge
lineare Thunberg
mexicanum Britton

100. *Sedum rubroglaucum* Praeger (fig. 125).

S. rubroglaucum Praeger in *Journ. of Bot.*, 57, 51, 1919.

A small plant of the type of *S. spathulifolium* Hooker; its petals, connate in the lower part, class it with the group of species which BRITTON places in a separate genus, Gormaniana. From any other species of that type in cultivation it may be known by its combination of the following characters: stem crimson, leaves glaucous with a depressed apiculus and a clasping petiole, flowers large ($\frac{3}{4}$ inch across), yellow, few, petals broad, connate in the lowest fourth.

DESCRIPTION.—A small, dark-green, glaucous evergreen perennial, much flushed with crimson. *Roots* fibrous. *Barren stems* procumbent, bearing a loose rosette of leaves and emitting short, runner-like axillary shoots at first ascending and sparingly leafy, afterwards prostrate and naked save at the tips, where they produce similar rosettes and eventually root; stems crimson when young, black when old. *Flowering stems* erect, 2 inches high from the centre of the rosettes. *Leaves* mostly opposite, sometimes alternate, glaucous, extremely fleshy, shortly stalked, about $\frac{1}{2}$ inch long, $\frac{1}{8}$ inch broad, $\frac{3}{16}$ inch thick; lamina obovate, rounded at apex, with a short, depressed apiculus, flat or concave on face, the anterior edges sharply marked and meeting in the depressed apiculus, much rounded on back; petiole short, widening into a clasping base, not spurred, broad, so that those of an opposite pair of leaves meet or nearly so; leaves of flowering stems similar but narrower. *Inflorescence* of few, rather drooping flowers, on pedicels nearly as long as the flowers. *Buds* ovate, blunt. *Flowers* $\frac{3}{8}$ inch across, yellow. *Sepals* erect, very fleshy, free to the base, ovate, rather acute, green, nearly $\frac{1}{2}$ inch long. *Petals* twice the sepals, erect in lower part, spreading above, apiculate or blunt, ovate-oblong in upper half, cuneate in lower part, connate in the basal one-fourth, $\frac{3}{8}$ inch long. *Stamens* equalling the petals, filaments green, anthers yellow. *Scales* much broader than long, yellowish. *Carpels* equalling the stamens, erect, long, slender, green, tapering to very short styles.

Flowers September (in 1916, but very possibly the normal flowering time is earlier).

HABITAT.—California: Short Trail, Yosemite Valley.

This plant was sent fresh as gathered in June 1915, by Professor H. M. HALL, labelled "*Sedum obtusatum* or *yosemitense*," accompanied by *S. yosemitense* (from Ledge Trail in the same locality). It is quite different from *yosemitense*, which has green leaves without a clasping base, much smaller flowers, free lanceolate petals, &c. From those species of Gormaniana which have yellow flowers it is also easily dis-

tinguished. Only one of these is in cultivation so far as I am aware—*G. oregana* Britton (*Sedum oreganum* Nuttall, *S. obtusatum* of



FIG. 125.—*S. rubroglaucum* Praeger.

gardens), which is known at once by its very long, tapering, semi-erect petals. From true *S. obtusatum* the present plant differs in its much larger flowers, in the shape of its leaves, &c.

101. *Sedum divergens* S. Watson (fig. 126).

S. divergens S. Watson in "Proc. Amer. Acad.," 17, 372, 1882. "N. Amer. Flora," 22, 73, 1905.

SYNONYM.—*S. Willisii* (a *nomen nudum*) of gardens.

A pleasing little plant on account of its neat habit, the red tint which its leaves assume in exposure, and the large size of its deep yellow

flowers; becoming frequent in gardens, mostly under the erroneous name of *S. Willisii*. In appearance it is intermediate between



FIG. 126.—*S. divergens* S. Watson.

S. album and *S. oreganum*; it has the habit of the former, but its flat, obovate leaves tinged with red recall the latter. It differs from

both in having opposite leaves; from the former also in its flat (not subterete) leaves and yellow (not white) flowers; from the latter in its smaller, thicker leaves and wide-spreading (not nearly erect) shorter petals.

DESCRIPTION.—A small, creeping, glabrous, evergreen perennial. *Stems* slender, prostrate, rooting, with barren and flowering ascending reddish branches; barren branches many, leafy, 2 to 3 inches, flowering stems 3 to 6 inches, with larger similar leaves. *Leaves* opposite, smooth, green, often flushed red, $\frac{1}{4}$ by $\frac{1}{8}$ inch or a little more, half as thick as broad, very fleshy, sessile, obovate to obovate-spathulate, rounded at apex or with a blunt point on the under side, those of the flowering shoots often alternate. *Inflorescence* of 2 (sometimes 3) once or twice forked branches, with flowers in the forks, flattish, not very dense, 1–2 inches across, branches ascending in fruit. *Buds* ovate, bluntly pointed, strongly ribbed. *Flowers* $\frac{3}{4}$ inch across, longer than the pedicels. *Calyx* cup-shaped, lobes triangular, acute, fleshy, pale-green or reddish, separate nearly to the base. *Petals* bright yellow, patent, oblong-lanceolate, acute, thrice the sepals, keeled on back, deeply grooved on face. *Stamens* yellow, wide-spreading, equalling the petals. *Scales* very small, retuse, yellow to orange. *Carpels* greenish, shorter than the stamens, tapering into the slender styles, at first erect, soon spreading, stellate in fruit.

Flowers June.

HABITAT.—Western N. America from Oregon to British Columbia.

I have had in cultivation two wild gatherings sent from British Columbia, and also garden plants from about a dozen sources. The species appears very constant in its characters.

102. *Sedum Stahlia* Solms (fig. 127).

S. Stahlia Solms, "Samml. Bot. Gart. Strassburg," 1900, 4. "N. Amer. Flora," 22, 66.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 7908. "Gartenwelt," 8, 6, 1904 (photo).

Though described less than twenty years ago, this species is already very widely spread as a greenhouse plant. It cannot be confounded with any other *Sedum*, its rather large, egg-shaped, downy, red-brown opposite leaves being alone sufficient to distinguish it. These leaves fall off easily, and young plants arise from them very readily.

DESCRIPTION.—Evergreen perennial, finely downy. *Stems* many, erect or spreading, slender, woody below, 4 to 8 inches long, seldom branched save at the base, finely hairy above. *Leaves* opposite, egg-shaped, slightly flattened on face, sessile, very blunt, finely downy, about $\frac{1}{2}$ by $\frac{1}{4}$ by $\frac{1}{4}$ inch. *Inflorescence* a terminal cyme of 2 to 3 forked branches with flowers in the forks, 2 inches across, leafy, with bracts similar to the stem-leaves but smaller. *Buds* lanceolate, rather acute, ribbed. *Flowers* subsessile, $\frac{1}{2}$ inch across. *Calyx* bell-shaped, nearly erect, sepals green, fleshy, hairy, lanceolate, free nearly to the base. *Petals* yellow, twice the sepals, lanceolate, shortly acuminate, wide-spreading in upper part. *Stamens* yellow, erect, slightly shorter than the petals. *Scales* small, yellow, spreading, emarginate, as broad as long. *Carpels* yellow, erect, slender, equalling the stamens, styles short.

Flowers August–September (cold frame). Hardy at Cork (R. H. Beamish), Warley (Miss Willmott), Waltham Cross (E. A. Bowles), and Rostrevor (Sir John Ross). Nearly hardy at Dublin.

HABITAT.—Puebla, Mexico.

Named after Professor Ernst Stahl of Jena.

103. *Sedum Zentaro-Tashiroi* Makino (fig. 128).

S. Zentaro-Tashiroi Makino in *Bot. Mag., Tokyo*, 24, 125, 1910.

ILLUSTRATION.—*Loc. cit.*, fig. 12.

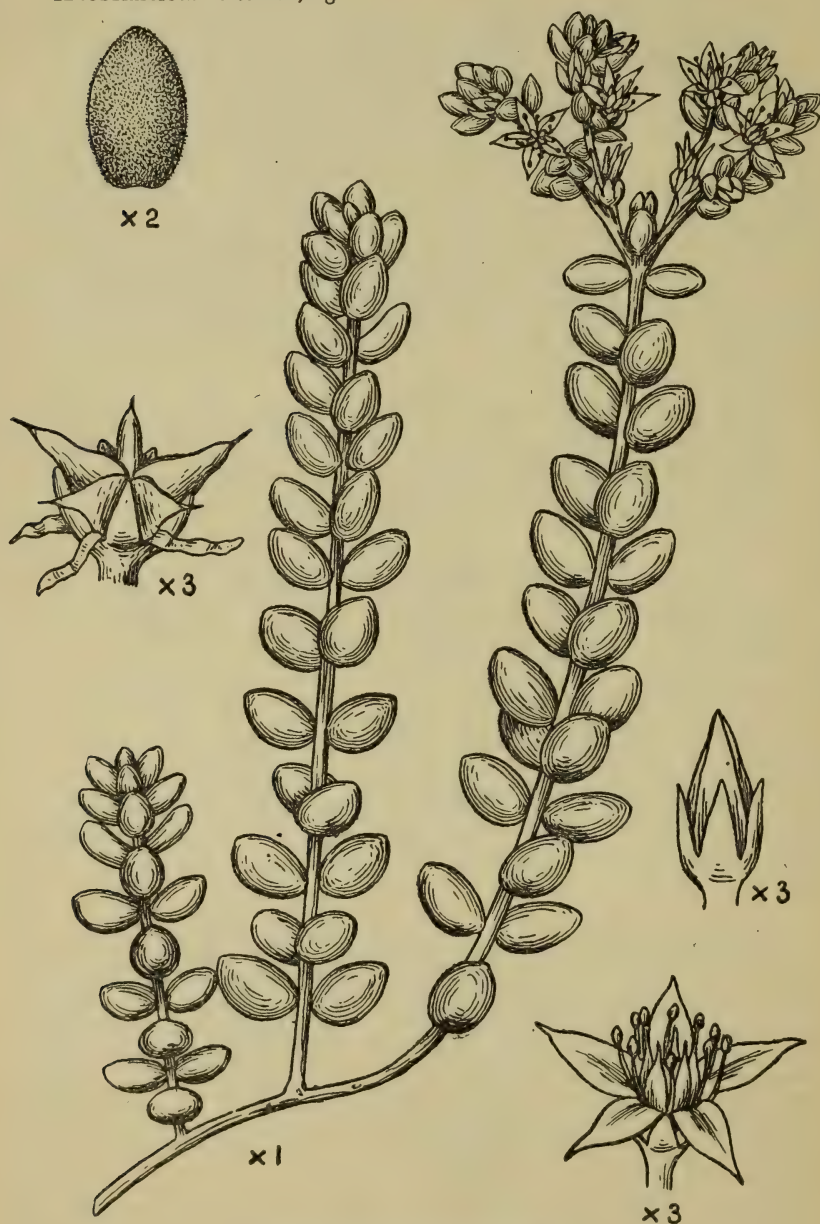


FIG. 127.—*S. Stahlia* Solms.

This plant is included in the present account since it is stated to be in cultivation at Tokyo. It is a small, yellow-flowered species related to *S. subtile* Miquel, which also belongs to Japan. Its creeping

stems with ascending branches, spatulate leaves in whorls of four, and few-flowered cymes of yellow flowers distinguish it. The following account is condensed from the original description and figure.

DESCRIPTION.—A small, glabrous, caespitose perennial. *Roots* fibrous. *Stems* creeping, with erect or ascending simple branches 2 to 5 inches high, round, light green, purplish and rooting at base. *Leaves* 4- (occasionally 5-) verticillate, or the upper ones alternate, shorter than the internodes, those of the



FIG. 128.—*S. Zentaro-Tashiroi* Makino.

barren shoots and lower part of flowering shoots spatulate-obovate, obtuse or subretuse at apex, attenuated into a petiole; largest above, upper leaves of flowering shoots spatulate-linear, obtuse or acute, narrower below, $\frac{1}{4}$ inch long. *Inflorescence* a 2- or 3-branched few-flowered cyme, branches 2- to 3-flowered, bracts linear, green. *Flowers* short-stalked, $\frac{1}{4}$ inch diameter, yellow. *Sepals* unequal, linear to linear-lanceolate, blunt. *Petals* wide-spreading, ovate-lanceolate, shortly acuminate. *Stamens* scarcely shorter than the petals, filaments yellow, anthers reddish. *Scales* minute, spatulate-oblong, truncate-rounded at apex. *Carpels* erect, lanceolate, connate below, greenish-yellow; styles slender, $\frac{1}{4}$ the ovaries. Fruit spreading.

Flowers May. ? Hardy.

HABITAT.—Japan. Named after the finder, who obtained it in the province of Tsushima in 1909.

The figure has been copied from that accompanying the original description, enlarged to natural size.

104. *Sedum Chauveaudi* Hamet (fig. 129):

S. Chauveaudi Hamet in Lecomte, "Notulæ Systematicæ," 1, 137, 1909.

SYNONYM.—*S. triphyllum* Praeger in *Journ. of Bot.*, 57, 54, 1919.

A Chinese plant resembling *S. sarmentosum* Bunge and *S. lineare* Thunberg in its free, creeping habit and leaves borne in threes; but the leaves are blunt and broadest near the apex (not pointed and broadest below the middle), and its compact, very leafy, inflorescence is widely different from that of either of the species mentioned. It differs also in many floral characters, such as its spathulate sepals.

DESCRIPTION.—A glabrous, evergreen perennial, creeping vigorously and emitting roots freely from all the older joints. *Barren shoots* 6 to 9 inches long, leafy, tips ascending, stem round, red, slightly rough. *Flowering shoots* similar, shorter, not rising above the barren ones, unbranched, leafy, densely mammillate in the upper part. *Leaves* of the barren shoots ternate, equalling or longer than the internodes, oblong-oblancoelate, tapered below, scarcely stalked, rounded at apex, flat, slightly fleshy, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, $\frac{3}{16}$ inch broad, spurred, basal part erect, upper part spreading, beaded on margin, fresh green, pale below; young leaves often with a silvery margin; spur blunt, generally deltoid, sometimes bifid; leaves of the flowering shoots similar, the upper ones often alternate. *Inflorescence* terminal, dense, very leafy, flat, 1 to 2 inches across, of three dichotomous branches with flowers in the forks; lowest flower shortly stalked, rest sessile or subsessile; bracts crowded, large, resembling the leaves, spurred, edges beaded. *Buds* lanceolate, with a campanulate calyx, blunt, ribbed, streaked with red. *Flowers* yellow, $\frac{5}{8}$ inch across. *Sepals* unequal, very blunt, separate nearly to the base, bluntly spurred, greenish yellow streaked with red, the larger spathulate, $\frac{1}{2}$ inch long, the smaller spathulate-linear, $\frac{1}{4}$ inch long. *Petals* linear-lanceolate, rather acute, hooded at the tip, $\frac{3}{4}$ inch long, $1\frac{1}{2}$ to 2 times the sepals, yellow, streaked with red on back. *Stamens* 10, nearly equalling the petals, the epipetalous ones inserted $\frac{2}{3}$ from the base of the petals, filaments yellow, anthers orange-red. *Scales* small, quadrate, orange. *Carpels* slender, erect, nearly as long as the stamens, greenish yellow, the slender styles occupying $\frac{1}{3}$ of the length.

Flowers August–October. Hardy at Dublin.

HABITAT.—Yunnan. Raised from seed collected by Rev. Père E. E. MAIRE near Tong-tchouan in 1915, labelled "Rochers à mi-mont, altitude 2,990 mètres."

HAMET, perhaps by a slip, describes the flowering stems as erect, 18–22 cm. high, and rather robust, and the barren shoots as short (3–6 cm.). On the strength of these and minor differences, I described Père MAIRE's plant as new (*loc. cit.*). If the dimensions of the barren and fertile shoots are interchanged, this description will fit both plants in the Lévillé herbarium named *Chauveaudi* by HAMET, and also the plants which I have had in cultivation for some years. HAMET does not mention the dense mammillation of the flower-stems, a conspicuous feature of the living plant, and sufficiently obvious in dried material.



FIG. 129.—*S. Chauveaudi* Hamet.

105. *Sedum sarmentosum* Bunge (fig. 130).

S. sarmentosum Bunge in "Mém. Sav. Etr. Pétersbourg," 2, 104, 1835.
 Maximowicz in *Bull. Acad. Pétersb.*, 29, 149. (Not *S. sarmentosum*
 Masters in *Gard. Chron.* 1878, ii. 626, which is *S. mexicanum*
 Britton, see p. 229).

FIG. 130.—*S. sarmentosum* Bunge.

Easily known by its long, decumbent stems (which often grow a foot in the season) clothed with broadly lanceolate entire leaves

arranged in threes, and short flowering stems. Its nearest ally is the Japanese *S. lineare*, which is of similar appearance, but has longer leaves only half as broad and flowering stems several times taller; it is, moreover, tender, and unable to endure the winter out of doors. The variegated *Sedum* grown in greenhouses under the name of *S. sarmentosum variegatum*, or *S. carneum variegatum*, is a form of *S. lineare*, not of *sarmentosum* (see p. 229).

DESCRIPTION.—A glabrous, evergreen, prostrate perennial. *Stems* smooth, round, reddish; barren shoots long (to 1 foot or more), prostrate, rooting at the tip and occasionally elsewhere, often branched, in the open usually dying in winter save for the rooted base and tip; flowering shoots ascending, short (about 3 inches), unbranched. *Leaves* ternate, broadly lanceolate, acute, bright green, flat, fleshy, entire, sessile, 1 by $\frac{1}{4}$ inch, with a semicircular membranous adpressed spur, those of the barren and flowering shoots similar. *Inflorescence* a flat, rather lax, leafy cyme, of 3 often forked branches, 2 inches across. *Buds* ovate, acute. *Flowers* sessile save the lowest, $\frac{1}{2}$ to $\frac{5}{8}$ inch across. *Sepals* equal or nearly so, linear-lanceolate, green, fleshy, blunt, separate to the base. *Petals* bright yellow, linear-lanceolate, acute, wide-spreading, equalling the sepals or $\frac{1}{2}$ longer than them. *Stamens* spreading, shorter than the petals, filaments yellow, anthers yellow on the faces, red on the edges. *Scales* small, whitish, quadrate, slightly notched. *Carpels* yellow, compressed, equalling the stamens, in fruit spreading, overtopped by the large persistent calyx; styles tapering.

Flowers July. Hardy.

HABITAT.—North China, Japan.

Rather rare in cultivation. The name *sarmentosum* (Latin twiggy) is used in botany to signify the producing of runners as in the strawberry, and refers to the character of the barren shoots, which are very unusual in *Sedum*, though matched to some extent in its close ally *S. lineare*, and exceeded in the Mexican *S. longipes*.

106. *Sedum lineare* Thunberg (fig. 131).

S. lineare Thunberg, "Flora Japon.," 187, 1784. Miquel in *Annales Mus. Bot. Lugd.-Batauv.*, 2, 156. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 148.

The variegated form of this species has been long in cultivation under the names of *sarmentosum variegatum* and *carneum variegatum*. This form, which is well known, is more compact and stouter in growth than the type, as represented by the only living plant which I have seen, and by good dried specimens in the Edinburgh Herbarium. I had a long hunt for this (the type), but finally found it in one of the houses at Dahlem (Berlin Botanic Garden) under the name of *sarmentosum*, to which the present species is closely allied, but from which it is at all times distinguishable by its much narrower, longer leaves, taller flower-stems, and other characters.

DESCRIPTION.—A straggling, glabrous, evergreen perennial. *Stem* weak, decumbent and sometimes rooting below, reddish, round, smooth, branches mostly ascending, but barren shoots sometimes elongate, prostrate, and rooting as in *S. sarmentosum*; flower-stems about 6 inches, not shorter than the ascending barren shoots. *Leaves* ternate, linear to linear-lanceolate, rather light green, flat on face, paler and rounded on back, bluntly pointed, sessile, shortly spurred, ascending, $\frac{3}{4}$ –1 by $\frac{1}{4}$ inch, mostly exceeding the internodes. *Inflorescence* terminal, lax, flat, umbellate, 1 $\frac{1}{2}$ inch across, of a central, short-stalked flower

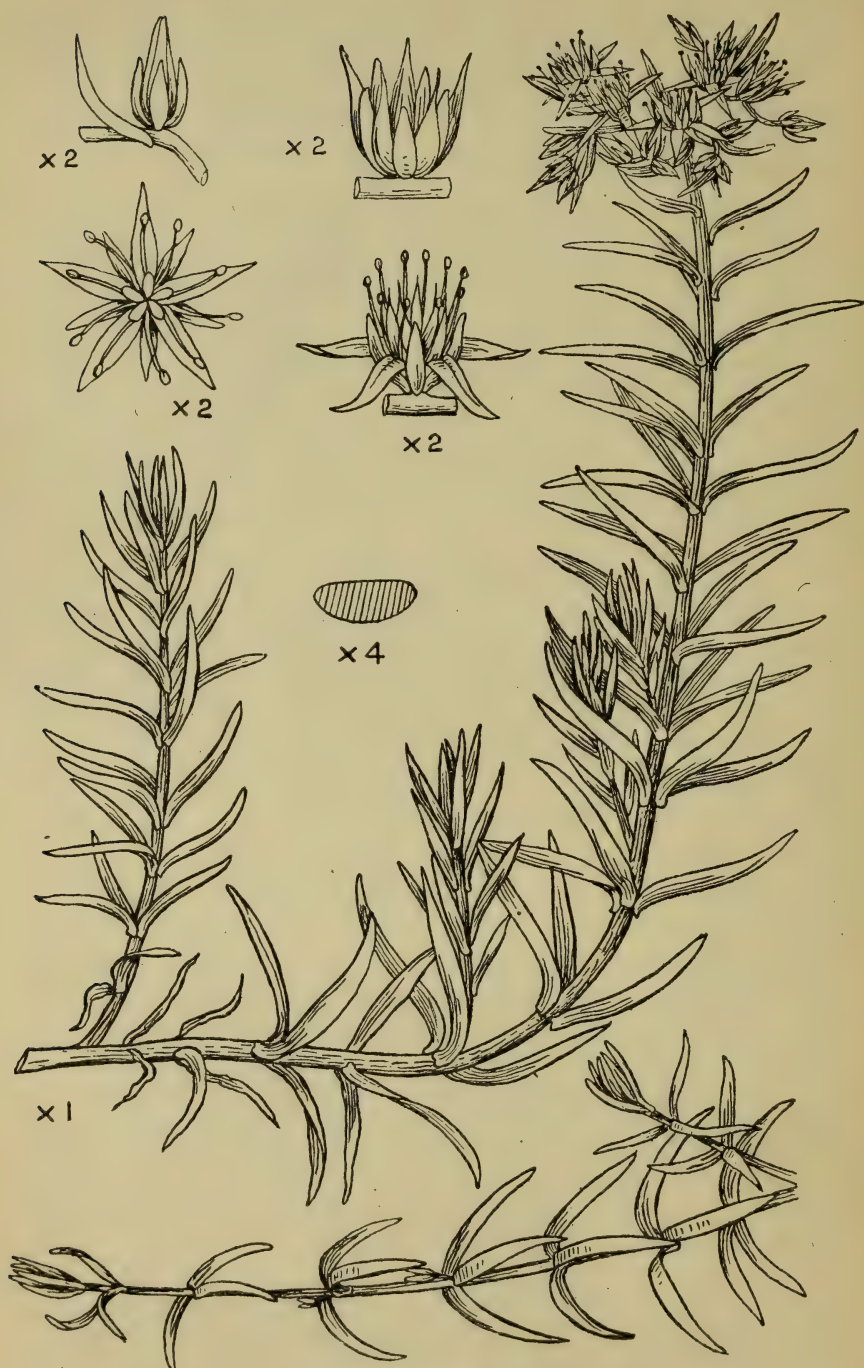


FIG. 131.—*S. lineare* Thunberg.

and 2 or 3 forked branches bearing sessile flowers. *Buds* lanceolate, acute. *Flowers* yellow, star-like, $\frac{3}{8}$ inch across. *Sepals* yellowish, narrowly lanceolate, blunt, ascending, standing up between the petals. *Petals* bright yellow, narrowly lanceolate, very acute, patent, twice the sepals. *Stamens* $\frac{3}{4}$ the petals, filaments bright yellow, anthers reddish. *Scales* small, pale yellow, broadest above, about as long as broad. *Carpels* yellow, slightly spreading, slender, tapering into the very slender styles, equalling the stamens.

Flowers May (gentle heat); July (cold frame). Nearly hardy at Dublin. Hardy at Rostrevor.

HABITAT.—Japan, China, ? Luchu Archipelago.

Var. robustum * var. nov. (fig. 132).

Plant grey-green, not bright green as in type, stouter and more branched, specially above. Inflorescence more leafy and often irregular in form. Flowers paler, sepals longer and broader, petals broader, carpels more divergent.

A curious form obtained at the Botanic Garden at Hamburg. Its greyish colour and stouter, more branched growth, give it a very distinct appearance, but no difference which could be called specific in the ordinary sense is to be found in the flowers. My plant sends up occasionally a variegated shoot.

f. variegatum.

SYNONYM.—*S. sarmentosum variegatum* and *S. carneum variegatum* of gardens. ILLUSTRATION.—Henderson's "Illustrated Bouquet," 3, pl. 60.

Leaves with a marginal stripe of white or cream, stems very pink. This is a rather stout form of the species, approaching in this respect var. *robustum* described above.

S. lineare appears to be a variable plant, as Miquel describes (*loc. cit.*) several varieties, differing from the type in stature and habit.

The specific name refers to the narrow leaves, which were originally described by THUNBERG (perhaps from dried specimens) as "*teretilinearis*."

107. **Sedum mexicanum** Britton (fig. 133).

S. mexicanum Britton in *Bull. New York Bot. Gard.*, 1, 257, 1899. "N. Amer. Flora," 22, 65.

SYNONYM.—*S. sarmentosum* Masters in *Gard. Chron.*, 1878, ii. 626, excluding the var., which = *S. lineare* f. *variegatum*, see Praeger in *Journ. of Bot.* 55, 214. (Not *S. sarmentosum* Bunge, for which see p. 226).

A floriferous and showy species with a wealth of golden-yellow flowers. Easily recognized at any period of growth by its light-green shining tint, and its nearly terete linear leaves which, even on the same plant, are arranged singly and in whorls of 3, 4, or 5.

* Cinereo-viride, quam typo robustior, ramosior. Inflorescentia perfoliosa, saepe irregularis. Flores quam typo pallidiores, sepalis longioribus et latioribus, petalis latioribus, carpellis divergentioribus.



FIG. 132.—*S. lineare* var. *robustum* var. nov.

DESCRIPTION.—Bright-green, glabrous, evergreen perennial. *Roots* fibrous. *Stems* decumbent, sinuous and rooting below, with many ascending or erect branches about 6 inches high, almost all of which flower. *Leaves* alternate or in whorls of 3 to 5, usually alternate on the upper part of the flowering shoots, bright green, sessile, linear, nearly terete, blunt, $\frac{1}{4}$ to $\frac{1}{2}$ inch long. *Cyme* terminal, flattish, leafy. *Flowers* golden yellow, sessile, $\frac{3}{8}$ to $\frac{1}{2}$ inch across. *Sepals* unequal, resembling the leaves in shape and colour. *Petals* lanceolate, acute, concave, wide-spreading, twice the sepals. *Stamens* nearly as long as the petals, filaments



FIG. 133.—*S. mexicanum* Britton.

yellow, anthers reddish. *Scales* minute, cuneate, yellow. *Carpels* slightly spreading, yellow, equalling the stamens.

Flowers April (gentle heat); June (cold frame). Not hardy at Dublin; nearly so at Rostrevor.

HABITAT.—Near Mexico City.

Though only described in 1899 from specimens raised in America from seeds collected near Mexico City, there is evidence of its cultivation in England at an earlier date. It is clearly the plant (of which MAXIMOWICZ remarks "mihi ignotum"), described by MASTERS in 1878 as *S. sarmentosum* Bunge (a Chinese species), under which name

S. mexicanum was grown in the Succulent House at Kew until quite recently. The presumption is that MASTERS compiled his description from the plant at Kew, where he obtained much of the material for his monograph. There is no record as to the source of the Kew plant.

The species came to me from New York Botanic Garden, and also from the Villa Thuret, Cap d'Antibes (without a name), and I have seen it at Bremen (labelled "*sp. aus Mexico*") and Berlin (labelled *reflexum*); also, to my surprise, as a pot plant in a cottage window at Thomastown, in Co. Kilkenny, in Ireland.

(2) Leaves alternate.

(i.) *Leaves spathulate, flat.*

S. Palmeri and *S. compressum* are closely allied Mexican plants. *S. variicolor* is Chinese, belonging to the group Japonica of MAXIMOWICZ. The remaining four species belong to a well-marked group of the Western United States, some of which have been placed by ROSE in a separate genus, *Gormaniana*.

Palmeri S. Wats.

compressum Rose.

variicolor Praeger.

spathulifolium Hooker.

yosemitense Britton.

Hallii nov. comb.

oreganum Nuttall.

108. *Sedum Palmeri* S. Watson (fig. 134).

S. Palmeri S. Watson in *Proc. Amer. Acad.*, **17**, 355, 1882. "N. Amer. Flora," **22**, 69.

One of the best and most distinct of Mexican Sedums, the abundant drooping sprays of golden blossom contrasting finely with the glaucous foliage. It is also one of the hardiest.

It is close to *S. compressum*, which, however, has acute leaves, while those of *Palmeri* are rounded or quite bluntly pointed. The latter are, moreover, of a different tint, being very glaucous, while those of *compressum* are rather of a pale green, tending to be suffused with red as they get old.

In its bare, sinuous stems and rosette-like terminal clusters of entire spathulate leaves, the plant recalls the European *S. Anacampteros*.

DESCRIPTION.—A glaucous evergreen perennial of sprawling habit. *Stems* rather sinuous, bare and rooting below, round and smooth, decumbent, with ascending branches, 6 to 9 inches high. *Leaves* spathulate, entire, about 1 by $\frac{5}{8}$ inch, rounded or very bluntly pointed at the apex, glaucous, somewhat reflexed, forming, save when in full growth, a loose terminal rosette. *Flower-stem* erect, lateral (in early stage drooping and appearing terminal), slender, 2 to 4 inches long, bearing small scattered leaves; in strong plants several axillary flowering stems are also produced from lower down the shoot. *Inflorescence* cymose, of several drooping, wide-spreading branches, 1-4 inches long, bearing on their upper side a double row of crowded flowers, each with an ovate bract, the lower ones with pedicels equalling the flowers. *Flowers* $\frac{3}{8}$ inch across. *Sepals* pale green, unequal, lanceolate to linear-oblong, rather acute, the exterior one much larger than the others. *Petals* orange, about equalling the longest sepal, lanceol.



FIG. 134.—*S. Palmeri* S. Watson.

late, spreading, acute. *Stamens* orange, nearly equalling the petals. *Scales* minute, roundish, greenish. *Carpels* orange, nearly erect, shorter than the stamens.

Flowers February–April (gentle heat); May–June (cold frame and open ground). Hardy at Dublin and at Warley, Essex.

HABITAT.—Nuevo Leon and Coahuila, Mexico.

Much rarer in cultivation than its merits deserve. I have received it from Washington (viâ Wisley), New York, and the Missouri Botanic Garden, also from Dresden and the Muséum d'Histoire Naturelle at Paris. It is in a few English gardens, and Perry of Enfield, Haage & Schmidt of Erfurt, and Correvon of Geneva have it for sale.

The name commemorates Dr. E. PALMER, one of the foremost of Mexican botanical explorers.

109. *Sedum compressum* Rose (fig. 135).

S. compressum Rose in "Contrib. U.S. Nat. Herb.," 12, 440, 1909.

ILLUSTRATION.—*Loc. cit.*, pl. 80 (photo).

Closely allied to the better known *S. Palmeri*, and very like it in habit and flower, but recognizable by its acute or apiculate leaves. The sepals also are acute (not blunt as in *Palmeri*), the flowers larger and the mature and fading leaves are often flushed with red, which never happens in the more glaucous *S. Palmeri*. The flowers are of the same brilliant orange colour.

DESCRIPTION.—Evergreen perennial, smooth and glaucous. *Stems* sprawling, ascending or erect, about 6 inches high, bare save near the top, often rooting when prostrate, round, smooth, marked with leaf-scars. *Leaves* oblanceolate-trapezoidal, about 1 by $\frac{3}{8}$ inch, broadest $\frac{2}{3}$ way up, sessile, acute or apiculate, fleshy, flat on face, convex on back, glaucous, edges often beaded, forming a loose rosette, older ones often flushed red. *Flower-stem* slender, apparently terminal, afterwards lateral, 1 to 2 inches long, with smaller leaves. *Inflorescence* a 2- to 3-branched cyme, branches secund, at first drooping, afterwards erect. *Buds* narrow, with adpressed sepals. *Flowers* showy, orange, $\frac{1}{2}$ inch across, the lower stalked, the upper sessile. *Sepals* unequal, ultimately deflexed, linear-lanceolate to ovate, yellowish green, flat on face, convex on back, separate almost to the base. *Petals* patent, later deflexed, ovate-lanceolate, acute, equalling or exceeding the longest sepal. *Stamens* spreading, orange, nearly equalling the petals. *Scales* very small, squarish, yellow. *Carpels* orange, slender, at first erect, later slightly spreading, equalling the stamens, styles long, very slender.

Flowers January–March (gentle heat); April–May (cold frame). One of the hardiest of Mexican Sedums; at Dublin survived in the open the very severe winter of 1916–7.

HABITAT.—Tamaulipas, Mexico.

Received from Washington, and also (unnamed, mixed with *S. Palmeri*) from New York.

110. *Sedum varicolor* Praeger (figs. 136, 137).

S. varicolor Praeger in *Journ. of Bot.*, 57, 54, 1919.

A rather handsome, smallish Chinese perennial, unlike any other species in cultivation. To be recognized by the perennial growth of its stout, short, erect or widely divergent stems, its flat, entire, oblong-

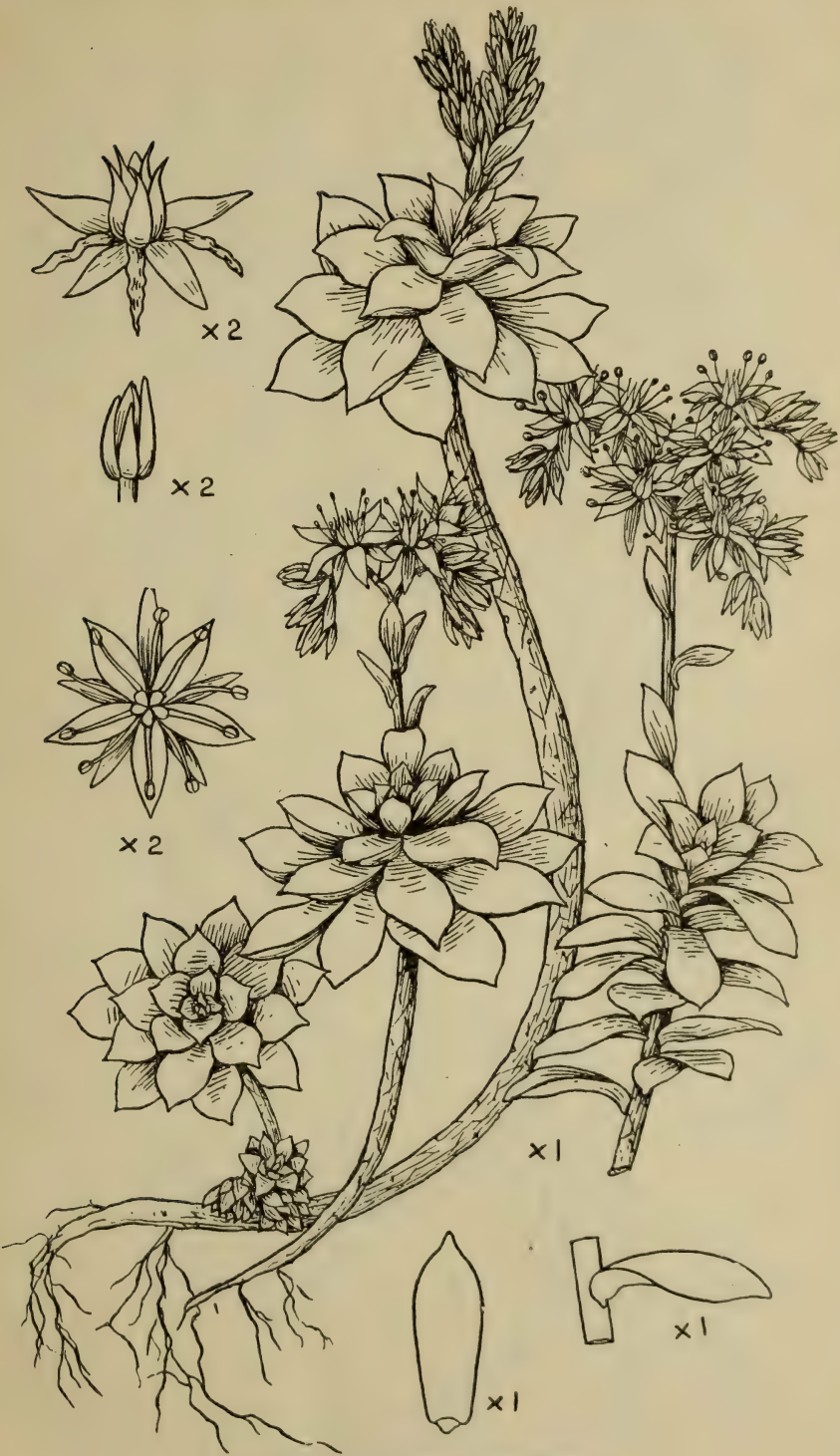


FIG. 135.—*S. compressum* Rose.



FIG. 136.—*S. variicolor* Praeger.

spathulate leaves which fall in autumn, its large, lax, cymes of showy yellow flowers, and its peculiar carpels at first concave on the inner edge.

DESCRIPTION.—A smallish, glabrous, deciduous, perennial. *Rootstock* very short, thick, emitting strong fibrous roots below and many stems above. *Stems* perennial, half a foot long, erect, spreading, or procumbent, with short, wide-spreading, leafy, barren and flowering branches, about $\frac{3}{16}$ inch thick, minutely roughened, dark brownish and bare in lower part, green or reddish above. *Leaves* alternate, occasionally subternate, rather crowded, sessile, entire, flat, glabrous, oblong-spathulate or broadly oblanceolate, tapered below, shortly spurred, bluntly pointed and often slightly apiculate at apex, fleshy, bright green, $\frac{3}{4}$ inch long, $\frac{1}{4}$ inch broad, spur truncate. *Inflorescence* flat, 2 to 3 inches across, of three usually dichotomous, wide-spreading, finely mammillate, leafy branches with flowers in the forks, lowest flower as long as its pedicel, the rest subsessile or sessile; lower bracts resembling the leaves, upper bracts linear. *Buds* ovate, with a campanulate calyx, bluntly pointed, ribbed, the ribs green, yellow, or red. *Flowers* $\frac{5}{8}$ inch across, usually bright yellow. *Sepals* leaf-like, green, fleshy,

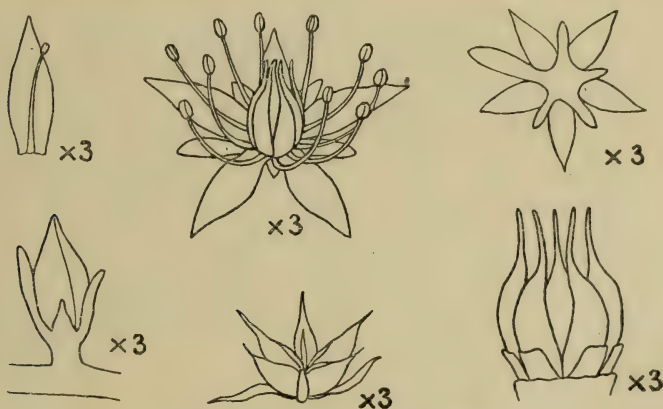


FIG. 137.—*S. varicolor* Praeger.

blunt, very unequal, from $\frac{1}{4}$ inch to $\frac{3}{8}$ inch long, from deltoid to oblong-linear or oblong-lanceolate or oblong-spathulate, widened at the base, not spurred, pale green, tube very short. *Petals* ovate-acuminate to lanceolate, with a short mucro behind the tip, patent, about equalling the longest sepal, $\frac{5}{16}$ inch long, deep yellow. *Stamens* spreading, slightly shorter than the petals, filaments tapering, yellow, anthers reddish. *Scales* quadrate, slightly retuse, lemon yellow. *Carpels* slender, equalling the stamens, at first erect with the inner edges concave and the styles contiguous, soon spreading, but not widely, with erect styles; styles long, slender, occupying nearly half the length of the carpels. Fruit stellate, $\frac{3}{8}$ inch across.

Flowers August–September. Hardy at Dublin.

HABITAT.—Yunnan. Seed was received from Rev. Père E. E. MAIRE in 1915 from Tong-tchouan, labelled “Eboulis des rochers des pics, altitude 2,800 mètres.”

This is a handsome little plant, and if it proves to be generally hardy, will deserve a place in the rock garden. The flowers are usually of a rich orange-yellow, but in the batch of plants raised from Père MAIRE’s seed there was a variety of colour unusual in the genus. Some plants bore pale-yellow flowers, others deep orange, while in others again red colour was added to enhance the deep-yellow blossoms; in one of the

most striking forms the stamens were crimson, the scales flushed with red, and the carpels deep yellow with the inner face crimson.

It derives its name from this variation in colour.

III. *Sedum spathulifolium* Hooker (fig. 138).

S. spathulifolium Hooker, "Flor. Bor. Amer.," 1, 227, 1832. Masters in *Gard. Chron.*, 1878, ii. 376 (but not fig. 68). "N. Amer. Flora," 22, 72.

A number of the North American Sedums are small species with spathulate leaves and yellow flowers, but only a few are in cultivation. The present species belongs to this group and may be distinguished by its loose rosettes of glaucous foliage turning red, its short, horizontal runner-like shoots, and its ample flat inflorescence. In one variety the plant is green, not glaucous.

DESCRIPTION.—A small evergreen glaucous perennial, forming a close, flat clump, tinged red in exposure. *Roots* fibrous. *Stems* smooth, round; the barren ones very short, erect, bearing a loose rosette of leaves about 1 inch across and emitting at base runner-like prostrate shoots 1 to 2 inches long, bare of leaves save near the ends, where they send out roots and form similar leaf-rosettes; flower-stems erect, leafy, 3 to 5 inches high. *Leaves* of barren shoots flat, fleshy, spathulate, with an abrupt pointed recurved tip, tapered below, 1 inch long by $\frac{3}{8}$ inch wide, glaucous, very white on back; those of flowering shoots distant, oblong, sessile, very fleshy. *Inflorescence* a large, flattish, rather dense, leafy cyme, 2 to 3 inches across. *Buds* ovate-lanceolate, acute. *Flowers* bright yellow, $\frac{1}{2}$ to $\frac{3}{4}$ inch across. *Sepals* glaucous, tapering, acute, standing up between the petals, tube short. *Petals* patent or slightly reflexed above, lanceolate, acute, bright yellow, more than twice the sepals. *Stamens* erect, slightly shorter than the petals, filaments yellow, anthers orange. *Scales* small, quadrate, orange. *Carpels* green or yellow, shorter than the stamens, much compressed, erect at first, soon spreading; wide-spreading in fruit.

Flowers May–June.

HABITAT.—British Columbia to California.

Generally found in gardens (in which it has a wide distribution, and is generally correctly named) in the small glaucous form with leaves often tipped with red, which may be regarded as typical; four native gatherings received from Western America all belong to this, or come close to it; but several other forms are occasionally found in cultivation. The first of these is so distinct as to merit a varietal name, and it is described below. Another, which came from the Royal Horticultural Society and from Kew, is, like the last, larger than the type, with leaves glaucous when young and deep purple when mature, and from the horticultural standpoint deserves a name. A third form, received from Canon ELLACOMBE, has an almost round tip end to the leaf (owing to the apiculate tip being much deflexed), which gives it a distinct appearance.

Var. *majus* var. nov.* (fig. 138, a).

Rosettes of barren shoots twice as large as in type, of about twenty, instead of ten, leaves. Leaves longer and broader, more apiculate,

* Rosulae quam in typo duplo majores, foliorum 15–20 composita. Folia longiora et latiora, magis apiculata, viridia, vix glauca, nec rubro-tincta, inflorescentia major.

green, scarcely glaucous, not suffused with red when old. Inflorescence larger.

No doubt a wild American form, as Sedums, being increased by division in most cases, do not tend to give garden sports. Received as "*Sedum* 'W. Pascoe'—*S. spathulifolium* \times *obtusatum*," from Messrs.



FIG. 138.—*S. spathulifolium* Hooker.

STORMONTH (but it has no *obtusatum* blood in it); as "*S. spathulifolium* 'Wansfell' var." from Mr. WALPOLE, of Mount Usher, Co. Wicklow; and as *S. spathulifolium* from several other sources.

Var. *purpureum* var. nov.*

Rosettes large, $1\frac{1}{2}$ to 2 inches across, leaves deep-purple except when young, when they are white and mealy, inflorescence large.

* Rosulae amplae, folia atropurpurea, folia juvenia farinosa, inflorescentia ampla.

A handsome form, the bright-yellow flowers contrasting well with the purple foliage. Received from Wisley and from Kew, and Mr. CLARENCE ELLIOTT tells me he has it.

Attempts to illustrate the species have been unfortunate. The figure in *Gardeners' Chronicle*, 1878, ii. 377, has the leaves of *S. oreganum*, whilst the inflorescence is uncertain. That in *Gartenflora*, t. 741, is also wrong, though I am not sure what species it represents.

112. *Sedum yosemitense* Britton (fig. 139).

S. yosemitense Britton in *Bull. New. York Bot. Gard.*, 3, 44, 1903.

A mat-forming plant after the style of *S. spathulifolium* Hooker, resembling it in its rosettes of leaves arising from short, horizontal, leafless axillary shoots; but the leaves are fresh green, not glaucous as in typical *spathulifolium*, causing the plant to approach more nearly a small form of var. *majus* Praeger of the former species; the leaves come near those of *S. oreganum* Nuttall, but in their arrangement are different. The flowers are near those of *spathulifolium*, and have no resemblance to those of *oreganum*.

DESCRIPTION.—A small, glabrous, evergreen perennial, forming a loose mat. *Barren stems* axillary, leafless and horizontal below, ending in a short, erect rooting rosette of leaves. *Flowering stem* from the centre of the rosette, erect, leafy, unbranched, 3 to 4 inches high, smooth, round. *Leaves* of rosettes alternate, sessile, ovate-spathulate, very blunt, mostly bluntly apiculate, flat, very fleshy, often suffused with red, $\frac{1}{2}$ to $\frac{3}{4}$ inch long by $\frac{1}{4}$ to $\frac{3}{8}$ inch wide; those of the flowering shoots alternate, oblong or club-shaped, longer than the internodes, shortly and bluntly spurred. *Inflorescence* terminal, flat, about $1\frac{1}{2}$ inch across, of three forked branches with a flower in the primary fork, each flower subtended by a blunt linear or linear-spathulate leaf-like bract; pedicels stout, shorter than the flowers, up to $\frac{1}{2}$ inch long on lowest flowers, uppermost flowers sessile. *Buds* ovate-oblong, bluntly pointed, with short greenish ribs. *Flowers* $\frac{1}{2}$ inch across. *Calyx* cup-shaped, over $\frac{1}{2}$ inch long, green, fleshy, the segments oblong, bluntly pointed, longer than the tube. *Petals* wide-spreading, free to the base, oblong-lanceolate, acute, bright yellow, grooved on face, over $\frac{1}{2}$ inch long by over $\frac{1}{10}$ inch wide. *Stamens* spreading, a little shorter than the petals, filaments greenish, anthers bright yellow, attached close to the base of the petals. *Scales* minute, quadrate, retuse, yellow. *Carpels* slender, erect in flower, pale green, a little shorter than the stamens, spreading in fruit.

Flowers May.

Although my plants differ from Dr. BRITTON's description of *S. yosemitense* in their flowers being bright yellow, not "pale yellow," and the leaves being spathulate rather than "obovate-orbicular to broadly obovate" and $\frac{1}{2}$ to $\frac{3}{4}$ inch long instead of "1 cm. or less," the essential portions of the description agree, and I have little doubt in retaining under this name my material, which I owe to the kindness of Prof. H. M. HALL, one of the original finders of the plant in the Yosemite Valley, to which, as at present known, it is confined; he sent it (as *S. yosemitense*) in June 1915, from Ledge Trail, Yosemite Valley, California.

113. *Sedum Hallii* nov. comb.

SYNONYM.—*Gormania Hallii* Britton in *Bull. New York Bot. Gard.*, 3, 29, 1903. "N. Amer. Flora," 22, 48.

A little plant resembling *S. yosemitense* in its vegetative parts, but the inflorescence is thyrsoid and mostly longer than broad, not

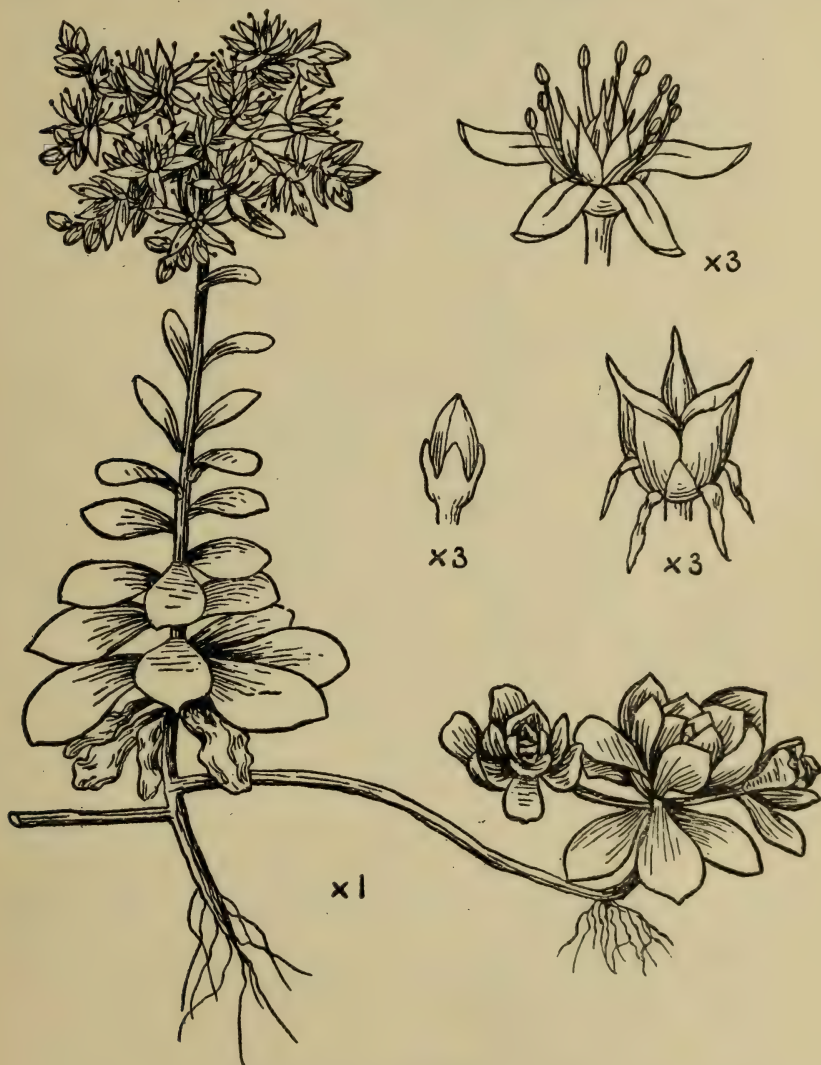


FIG. 139.—*S. yosemitense* Britton.

flat as in the latter species. Plants kindly sent me by Dr. ROSE died on arrival, but the plant is included here since it is in cultivation in Washington. The description is from "N. American Flora."

DESCRIPTION.—Spreading, matted, green, not glaucous, the flowering stem 3 inches high or less. Leaves spatulate to spatulate-obovate, $\frac{3}{4}$ inch long or less,

about $\frac{3}{10}$ inch wide, rounded or slightly retuse at the apex, a little concave on the upper surface, the upper ones similar, narrower. *Calyx* about $\frac{1}{8}$ inch long, its lobes oblong-lanceolate, obtusish. *Corolla* about $\frac{5}{16}$ inch long, bright yellow, its tube somewhat shorter than the calyx, its lobes oblong-lanceolate, obtusish.



FIG. 140.—*S. oreganum* Nuttall.

Pedicels very slender, $\frac{1}{16}$ to $\frac{5}{16}$ inch long. *Cyme* little compound, thyrseoid, about 1 inch broad, 1 to 2 inches high.

Flowers July (in its habitat).

HABITAT.—Yosemite National Park, California.

114. *Sedum oreganum* Nuttall (fig. 140).

S. oreganum Nuttall, Torrey & Gray, "Flora N. America," 1, 559, 1840.

SYNONYMS.—*S. obtusatum* of gardens (not of A. Gray, "Proc. Amer. Acad.," 7, 342). *Gormania oregana* Britton in *Bulletin New York Bot. Gard.* 3, 30, 1903. "Sp. British Columbia," of some nurserymen's lists.

Not uncommon in gardens under the name *S. obtusatum*, an allied plant which is not in cultivation so far as I know. Among the group

of North American yellow-flowered spathulate-leaved Sedums it may be distinguished by its remarkably long, acute, sub-erect petals (resembling in shape and position those of the common *S. spurium*), and tapering buds no less than $\frac{5}{8}$ inch long.

DESCRIPTION.—A small, creeping, glabrous evergreen perennial, forming a green mat tinged red. *Stems* many, creeping, bare below, round, smooth, with many ascending branches; barren shoots 1 to 3 inches high, leafy, flowering shoots about 6 inches, unbranched, leaves more distant. *Leaves* alternate or opposite, shining green, often suffused with red, flat, very fleshy, spathulate, sessile, very blunt at apex, tapered below, about $\frac{3}{4}$ by $\frac{3}{8}$ inch; those of flowering stems similar. *Inflorescence* flat, $1\frac{1}{2}$ inch across, of 2 or 3 simple, forked, or twice-forked branches with flowers in the forks, bracts similar to the leaves, the uppermost ones very small. *Buds* ovate-elongate, $\frac{5}{8}$ inch long, tapered to a long, slender point. *Flowers* sessile or lower ones shortly stalked, not opening widely. *Sepals* ovate-lanceolate, acute, green, only slightly fleshy, tube short. *Petals* lanceolate-attenuate, erect or slightly spreading, tapering to a long point, united in their lowest $\frac{1}{2}$, nearly thrice the sepals, yellow. *Stamens* yellow, erect, $\frac{3}{8}$ the petals. *Scales* small, yellow. *Carpels* green, erect, equalling the stamens, nearly erect in fruit.

Flowers July–August.

HABITAT.—Western North America from Alaska to Northern California. Named after the locality in which it was first discovered—the mouth of the Oregon River.

(ii.) *Leaves not broadest above (ovate to linear).*

No fewer than twenty-two of the cultivated Sedums fall under this definition, natives of various parts of Europe, Asia, and America. The best-marked group among these is that formed by the last seven species, formed of six European and one (*S. stenopetalum*) N. American plant, and well illustrated by the British *S. rupestre* and *S. reflexum*. Resembling these in their linear leaf-form, but differing by their stellate fruit and smaller size, come three Himalayan or Chinese plants—*S. multicaule*, *trullipetalum*, *Celiae*, belonging to the group Japonica. *S. nudum* and *lancerottense* are closely allied tender species with egg-shaped leaves, from the Atlantic islands. The remainder are a rather miscellaneous assortment.

humifusum Rose.
cupressoides Hemsley.
acre Linn.
Stribnyi Velen.
oaxacanum Rose.
nudum Aiton.
lancerottense R. P. Murray.
japonicum Siebold.
alpestre Villar.
Douglasii Hooker.
multicaule Wall.

trullipetalum H. f. & T.
Celiae Hamet.
multiceps Coss. & Dur.
sexangulare Linn.
rupestre Linn.
reflexum Linn.
altissimum Poiret.
anopetalum DC.
stenopetalum Pursh.
pruinatum Brotero.
amplexicaule DC.

115. *Sedum humifusum* Rose (fig. 141).

S. humifusum Rose in "Contrib. U.S. Nat. Herb.," 13, 298, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 55 (photo).

A delightful tiny species forming a fresh green, moss-like mat, and easily recognized by its strongly ciliate leaves and solitary star-like yellow flowers. In appearance nearest to *S. compactum*, but this has white sub-globular flowers and smooth leaves.

DESCRIPTION.—A minute evergreen mat-forming perennial. Marginal shoots creeping, somewhat elongate (up to 1 inch), the others more or less erect and forming tiny rosettes like those of a *Sempervivum*, $\frac{3}{16}$ inch across. The stems produce continually short axillary branches from about $\frac{1}{4}$ inch back from the growing point. Leaves closely imbricate, obovate, flattened, fleshy, strongly ciliate, with a little tuft of radiating hairs at the apex; old leaves reddish.



FIG. 141.—*S. humifusum* Rose.

Flower stems reddish, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, slender, with a few leaves. Flowers solitary, terminal, $\frac{3}{8}$ inch across. Sepals green, ovate, very fleshy, ciliate, leaf-like, one-half the petals. Petals bright yellow, ovate, acute, spreading widely. Stamens yellow, spreading, equalling the carpels. Scales small, cuneate, orange-yellow. Carpels erect, yellow, equalling the stamens.

Flowers April (gentle heat); June (cold frame). Not hardy.

HABITAT.—Querétaro, Mexico.

Received from Washington, also from Upsala (whence it came from Darmstadt). I have seen it at Edinburgh and Dresden, and it was shown at the Royal Horticultural Society in July 1916.

The name *humifusum* (= spread over the ground) well describes its habit.

116. *Sedum cupressoides* Hemsley (fig. 142).

S. cupressoides Hemsley, "Diagnoses Plant. Nov.," 1, 11, 1878. Hemsley, "Biol. Centr. Amer., Botany," 1, 393. "N. Amer. Flora," 22, 63.

ILLUSTRATION.—"Biol. Centr. Amer., Bot.," pl. 21.

A most distinct and interesting species, with the peculiar Cupressus type of foliage (from which it gains its name) that is met with in xerophilous forms of various genera, e.g., *Veronica* and *Crassula*. The flowers, which are bright yellow, were first described as rose-

coloured. It cannot be confused with any other garden species of *Sedum*. It appears to be closely related to *S. Greggii*, a species not in cultivation so far as I am aware, though its name occurs in garden lists; the plant so named is usually *S. moranense*, a larger plant than *Greggii*, and with white, not yellow, flowers.

DESCRIPTION.—A small, glabrous, evergreen perennial. *Stems* decumbent, bare, woody, and rooting below, with many short wide-spreading branches. *Leaves* very small, closely imbricate, adpressed, very fleshy, ovate-rhomboidal, blunt, flat on face, convex on back, $\frac{1}{16}$ inch long. *Flowers* $\frac{1}{2}$ inch across, sessile, borne

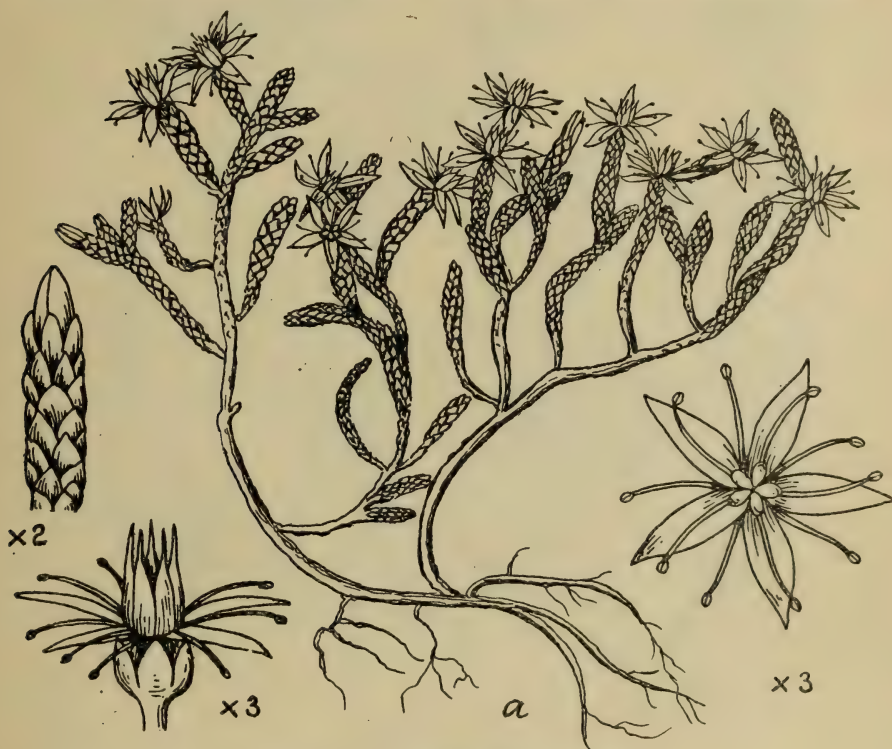


FIG. 142.—*S. cupressoides* Hemsl.

singly or 2 or 3 together at the ends of the branches. *Buds* lanceolate, blunt. *Sepals* green, fleshy, lanceolate, acute. *Petals* bright yellow, lanceolate, acute, wide-spreading, four times the sepals. *Stamens* nearly equalling the petals, wide-spreading, yellow. *Scales* yellow, as broad as long. *Carpels* yellow, erect, equalling the petals, styles long, slender.

Flowers July (gentle heat); August (cold frame). Sometimes survives the winter in the open in Dublin.

HABITAT.—Mountains of Oaxaca, Mexico.

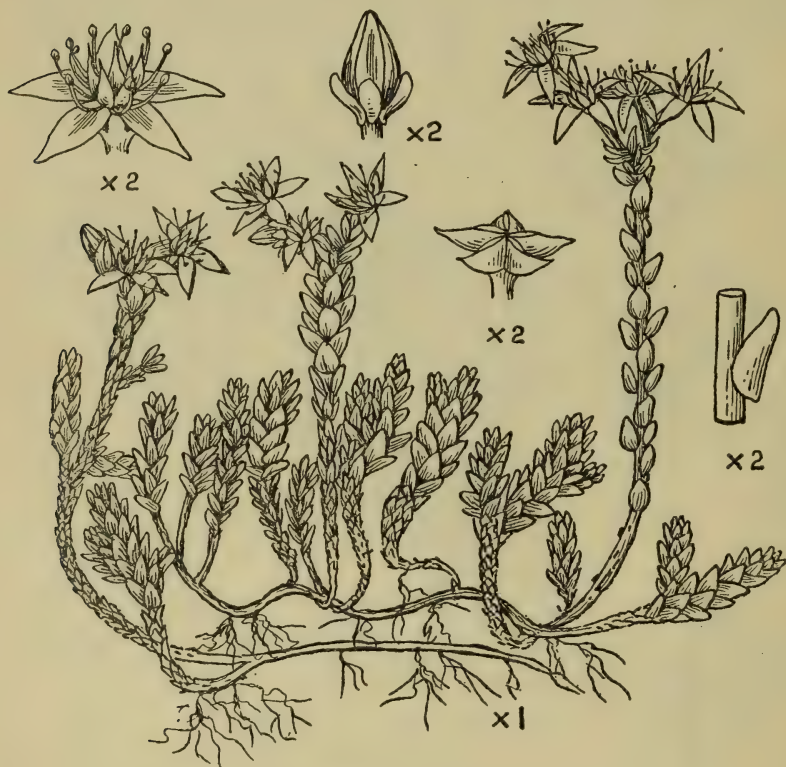
Received from Washington and Edinburgh, and also from the garden of the late Sir FRANK CRISP at Henley-on-Thames.

HEMSLEY'S figure differs somewhat from my living plants in its narrower leaves, shorter sepals and petals, and shorter and more erect stamens—differences probably sufficiently explained by the fact that his figures were drawn from dried specimens.

117. *Sedum acre* Linn. (fig. 143).

S. acre Linn., "Species Plantarum," 432, 1753. Masters in *Gard. Chron.* 1878, ii. 684.

ILLUSTRATIONS.—Sowerby, "English Bot." (ed. 3), pl. 532; Reichenbach, "Flor. German.," 23, tab. 51; De Candolle, "Plantes Grasses," tab. 117; "Flora

FIG. 143.—*S. acre* Linn.

Danica," tab. 1457; Curtis, "Flor. Londin.," 1, 114; Cusin and Ansberque, "Herb. Flore française, Crassul.," tab. 27; Tenore, "Flor. Nap." tab. 229; Plenck, "Icones Plant. Medicinalium," tab. 351.

S. acre when in flower cannot be confounded with any other of the cultivated species, its large yellow blossoms and flattish triangular leaves, very broad at the base, easily distinguishing it. *S. sexangulare*, which it resembles in size and colour, has linear leaves and smaller flowers; *S. anglicum*, which it somewhat resembles when out of bloom, has leaves broadest near the middle, not broadest at the base.

DESCRIPTION.—A small creeping evergreen forming a mat. Stem creeping and rooting, much branched. Barren branches erect, $\frac{1}{2}$ to 2 inches high. Leaves alternate, imbricate, green, smooth, ascending, ovoid-triangular, blunt, slightly spurred, $\frac{1}{16}$ to $\frac{1}{8}$ inch long by $\frac{1}{16}$ wide at base, having an acrid taste. Inflorescence a short cyme of 2 to 3 branches each with 2 to 3 flowers, and a flower in the fork. Buds conical. Flowers $\frac{1}{2}$ inch across. Sepals leaf-like, green, fleshy, lanceolate, blunt. Petals bright yellow, lanceolate, acute, wide-spreading, twice the sepals.

Stamens yellow, shorter than the petals. *Scales* whitish. *Carpels* yellow, slightly spreading, shorter than the stamens, stellate-patent in fruit.

Flowers June. Hardy.

DISTRIBUTION.—Europe, Asia Minor, N. Asia, N. Africa. A common British wild-flower in dry places, especially near the sea.

Named *acre* from its biting flavour. The plant had formerly some reputation as an emetic and cathartic. Like the Houseleek



FIG. 144.—*S. acre* var. *majus* Masters.

and some other Sedums, it is often planted on houses as a preventive of fire.

Var. *majus* Masters in *Gard. Chron.* 1878, ii. 685 (fig. 144).

Var. *Maweanum* of gardens. A very distinct form, much larger than the type, and of pale-green colour. *Leaves* in seven very crowded rows, ovate-oblong, blunt, up to $\frac{3}{8}$ inch long by $\frac{1}{8}$ inch broad. *Flowers* $\frac{5}{8}$ inch across. Compared with the type, a large and solid plant, which might well pass for a different species until it blossoms, when, except for size, no difference in the floral parts can be discerned. Morocco, on mountains south-west of Tetuan (Maw)—Masters. Not infrequent in cultivation, under the name *Maweanum*.

f. *aureum* Masters, *loc. cit.* 685.

Shoots tipped with golden variegation throughout the earlier part of the year. A bright little plant, often used for edgings and carpet-bedding. Probably of garden origin.

f. *elegans* Masters, *loc. cit.*

Shoots tipped with silver variegation in the earlier part of the year. Not so showy nor so hardy as the last.

OBSERVATION.—*S. Drucei* Graebner, in "Bot. Exch. Club Report" for 1912, 160. This is the common British *S. acre* L., and I have elsewhere (*Journ. of Bot.*, 65, 212) recorded the observations according to which I fail to distinguish between it and Continental forms of the same species.

118. *Sedum Stribrnyi* Velenovsky (fig. 145).

S. Stribrnyi Velenovsky in *Oesterr. Bot. Zeitschrift*, 42, 14, 1892. Halácsy, 'Conspect. Flor. Graecae,' 1, 585.

While resembling a small *reflexum* in its leafy parts, the inflorescence recalls rather that of *acre*. Its most distinctive character is the manner in which the flowering stems begin to fork almost from the base and continue dividing to near the top, so that a single stem may bear a dozen ultimate flowering branches. The lax disposition of the flowers on the branches is also characteristic. *S. Stribrnyi* is a dull little plant until it blooms, when it is showy and effective.

DESCRIPTION.—An evergreen, glabrous perennial forming a tuft. *Stems* rooting below, with many ascending branches; barren shoots much branched, ascending, 2 to 6 inches high, flowering shoots also branched, 3 to 6 inches high. *Leaves* crowded, of a rather glaucous green, linear, slightly tapering upwards, blunt, sessile, slightly spurred, $\frac{1}{2}$ inch long, subterete, slightly flattened, chiefly above. *Inflorescence* compound, each branch of the flower-stem ending in a 2- or 3-branched cyme with a flower at the fork; the cyme-branches straight, almost erect, 1 to 2 inches long. *Flowers* $\frac{1}{2}$ inch across, subsessile. *Sepals* slightly unequal, very fleshy, subterete, green, lanceolate, blunt, resembling the leaves, persistent in fruit. *Petals* bright yellow, very acute, wide-spreading, lanceolate, strongly keeled, less than twice the sepals. *Stamens* yellow, slightly shorter than the petals. *Scales* very small, pale yellow. *Carpels* spreading, greenish yellow, spreading in fruit, which is rather cup-shaped.

Flowers July. Hardy.

HABITAT.—Bulgaria, Greece.

Described comparatively recently from Bulgarian specimens, and since found in Greece. Unknown in cultivation until a few years ago, when Sir JOSSLYN GORE-BOOTH, while collecting in Bulgaria, received the plant from STRIBRNY and brought it home, but in his garden it got labelled *S. Sartorianum*. About the same time the late Mr. C. F. BALL, of Glasnevin Garden, brought it back from the same country without a name.

Named after the Bulgarian botanist Stribrny.

119. *Sedum oaxacanum* Rose (fig. 146).

S. oaxacanum Rose in "Contrib. U.S. Nat. Herb.," 13, 299, 1911.

A stout little yellow-flowered, much-branched, creeping species, of distinct appearance among cultivated Sedums. Its obovate,



FIG. 145.—*S. Stribrnyi* Velenovsky.

thick, flat, sessile leaves $\frac{1}{4}$ inch long, borne on rough stems which lengthen indefinitely, and yellow flowers borne singly or 2 or 3 together at the tips of the branches, will distinguish it.

DESCRIPTION.—A small, glabrous, evergreen, creeping perennial. *Roots* fibrous, strong. *Stem* much branched, prostrate, with ascending tips, rooting,

but not very freely, purplish, rough with minute spreading scale-like projections, up to $\frac{1}{4}$ inch diameter at base, where it is strongly rooted ; young branches $\frac{1}{8}$ inch diameter, branches widely divergent. *Leaves* alternate, longer than the internodes,

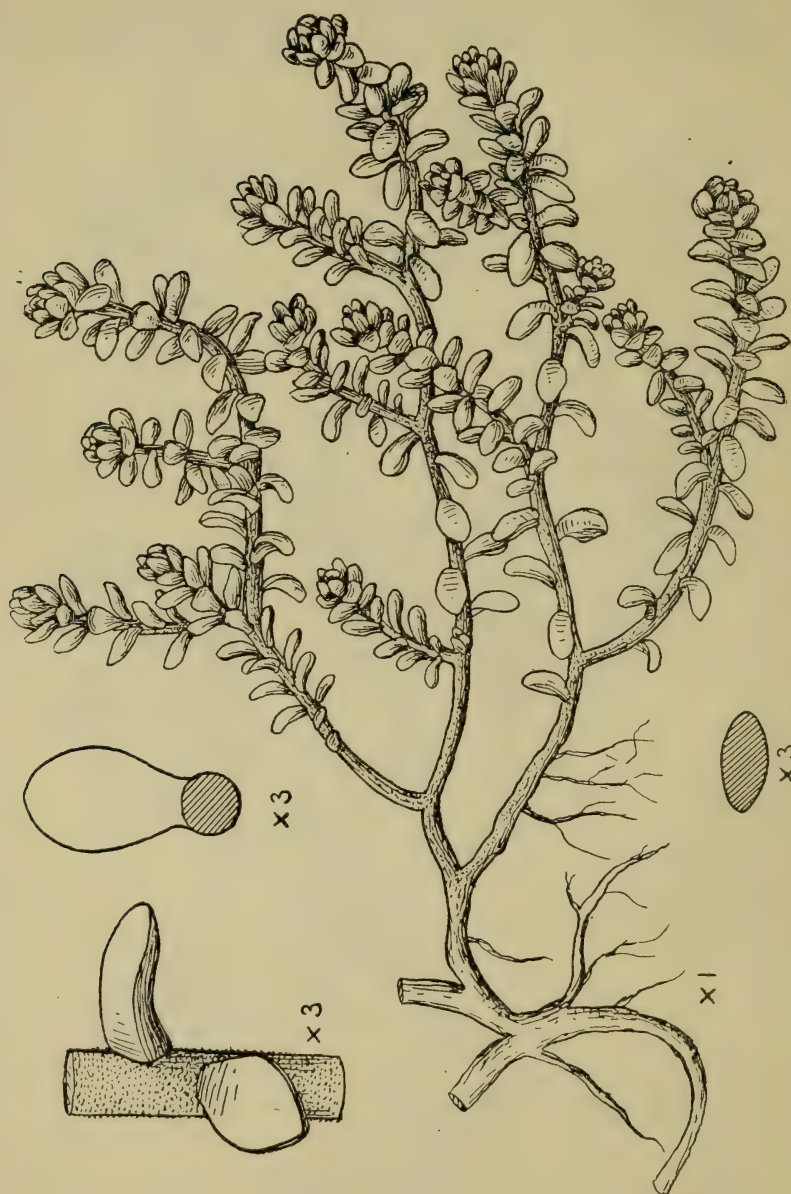


FIG. 146.—*S. oaxacanum* Rose.

patent, obovate, sessile, flattish, face convex longitudinally and transversely, about $\frac{1}{4}$ inch long, over $\frac{1}{4}$ inch broad, over $\frac{1}{10}$ inch thick, glabrous, greyish green ; young leaves with a whitish bloom, quite flat on face. *Inflorescence* terminal, of 1 to 4 flowers. "*Sepals* linear, 3 mm. long, distinct nearly to the base, petals yellow, distinct, longer than the sepals ; stamens 10 ; carpels 5, widely spreading, with long styles."

Not hardy.

HABITAT.—Cerro San Filipe, Oaxaca, Mexico.

Material sent from Washington (under the name *S. diversifolium* Rose), has grown freely but has never flowered, and the description of the flower given above is quoted from ROSE (*loc. cit.*).

Derives its name from its habitat, Oaxaca.

120. *Sedum nudum* Aiton (fig. 147).

S. nudum Aiton, "Hort. Kew." ed. 1, 2, 112, 1789. Lowe, "Flor. Madeira," 1, 324.

ILLUSTRATION.—De Candolle, "Plantes Grasses," tab. 155.

The only one of several interesting endemic Madeiran species which is in cultivation. The present plant has green, egg-shaped leaves (pale green in the plants I have seen), resembling those of short-leaved forms of *S. album*, and few-flowered cymes of small greenish-yellow flowers. In nature it forms a low, tangled subshrub, but the cultivated plant has weak, sinuous stems which sprawl on the ground. It is closely allied to *S. lancerottense* R. P. Murray, which is confined to Teneriffe; the differences between the two are discussed under the latter species.

DESCRIPTION.—A small, glabrous evergreen. *Stems* sinuous, in nature woody and forming a low subshrub, in cultivation weak, sprawling and occasionally rooting, bare below, with many ascending leafy shoots a few inches long. *Leaves* green or glaucous, sessile, obovate-oblong, very blunt, nearly terete, slightly flattened on face, alternate, set at right angles to the stem, up to $\frac{3}{8}$ inch long by $\frac{3}{16}$ broad and thick. *Inflorescence* a small few-flowered cyme, generally of 2 or 3 simple branches with a central flower, flowers about 4 to 10 in all, bracts resembling the leaves. *Buds* ovate, blunt, with greenish ribs. *Flowers* up to $\frac{1}{2}$ inch across, the lowest on a pedicel longer than the flower, the uppermost sessile. *Sepals* resembling the leaves, green, very fleshy, unequal, wide-spreading, obovate, very blunt, almost exactly egg-shaped, not spurred. *Petals* nearly twice the sepals, linear-lanceolate, rather bluntish, wide-spreading, greenish yellow, keeled. *Stamens* 10, spreading, shorter than the petals, filaments yellow, anthers brownish yellow. *Scales* orange, cuneate, notched, $\frac{1}{2}$ the carpels. *Carpels* divergent even in bud, wide-spreading later, greenish yellow, styles slender; stellate in fruit, when they are surrounded by the very swollen, unequal sepals.

Flowers May (Kew, gentle heat); June (cold frame). Not hardy.

HABITAT.—Madeira.

DE CANDOLLE states that it flowers in summer at Kew, in winter at the Jardin des Plantes. It is a shy bloomer in cultivation, and the flowers which I was fortunate enough to get at Kew were the first that had been noticed on the plant, which has been long in cultivation there. DE CANDOLLE states that MASSON, who discovered it, sent it to England in 1777. AITON ("Hortus Kewensis") states that it was received at Kew in that year. The plant, as cultivated there now, is quite possibly derived from the original stock. LOWE says the leaves are generally bright full green, occasionally pale or glaucous. The Kew plant is pale green, and produced as many as sixteen flowers on the inflorescence, the three branches of which were forked.

By the kindness of Dr. G. V. PEREZ, of Teneriffe, I received, in 1916, plants collected in Madeira the previous year by Señor MENEZES.

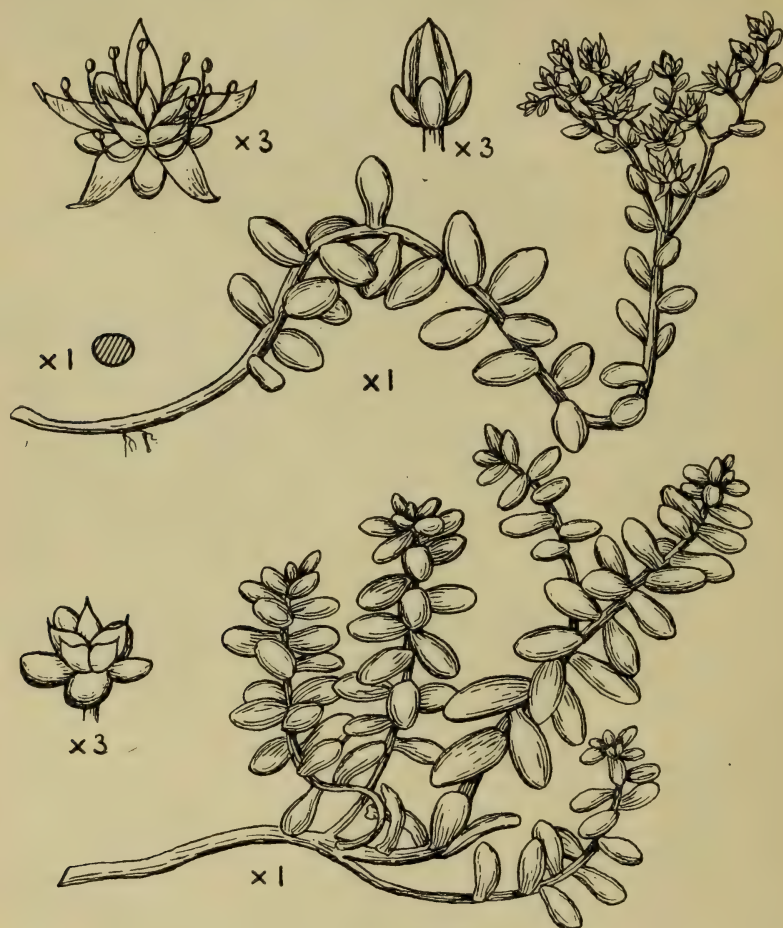


FIG. 147.—*S. nudum* Aiton.

They closely resemble the Kew plant, but the leaves were rather greener and more slender.

121. *Sedum lancerottense* R. P. Murray (fig. 148):

S. lancerottense R. P. Murray in *Journ. of Bot.*, **37**, 201, 1899.

This plant (the only *Sedum* in the Canaries, excepting the widely-spread annual *S. rubens*) comes very close to *S. nudum* Aiton from Madeira, and should possibly be looked on as a geographical race of that species; but without a greater variety of material for study (I have grown one gathering of *lancerottense* and two of *nudum*) I prefer to leave it as the describer has placed it. The best characters for distinguishing the two lie in the spurred sepals, minute yellow

scales, and carpels *at first erect* of *lancerottense*; in *nudum* the sepals

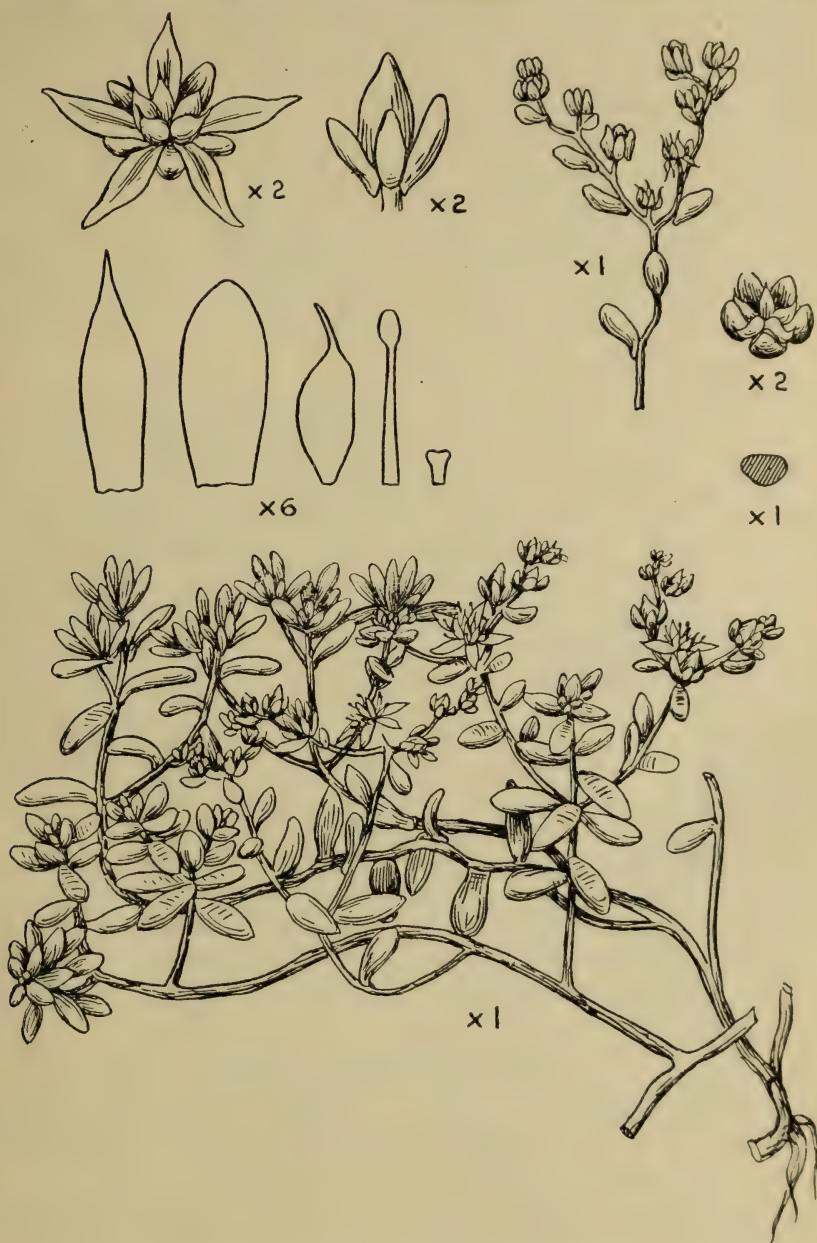


FIG. 148.—*S. lancerottense* R. P. Murray.

are not spurred, the scales are conspicuous, orange, $\frac{1}{3}$ as long as the carpels, and the carpels spreading, even in bud.

DESCRIPTION.—A small, pale green, glabrous, evergreen perennial. *Stems* sinuous, smooth, round, in cultivation weak, sprawling, and occasionally rooting,

brown and leafless below, with many ascending pale-green, wide-spreading, leafy shoots a few inches long. *Leaves* pale green, sessile, alternate, ovate-oblong or obovate-oblong, very blunt, nearly terete, slightly flattened on face, $\frac{1}{4}$ to $\frac{1}{2}$ inch long by $\frac{3}{16}$ inch in breadth and thickness, set at right angles to the stem, bluntly prolonged below the point of insertion. *Inflorescence* borne on shoots similar to the barren ones, terminal, a few-flowered cyme of 2 or 3 usually simple, spreading, zigzag branches with or without a central flower; flowers about 6 to 12 in all, each subtended by a bract resembling the leaves. *Flowers* yellow, $\frac{3}{8}$ inch in diameter, the lower with pedicels shorter than the flowers, the upper sessile. *Buds* ovate, bluntly pointed, strongly ribbed. *Sepals* resembling the leaves, green, very fleshy, unequal, oblong-ovate, very blunt, bluntly spurred. *Petals* twice the smaller sepals, longer than the longest sepal, free, lanceolate, acute, often with a short apiculus, patent above, yellow, keeled. *Stamens* 10, spreading, a little shorter than the petals, filaments greenish yellow, tapering, anthers oblong, yellow. *Scales* very minute, $\frac{1}{4}$ as long as the carpels, oblong-cuneate, yellow. *Carpels* equalling the stamens, at first erect, soon divergent, connate in lower half, greenish yellow, spreading in fruit, enclosed and equalled by the enlarging sepals.

Flowers summer. Not hardy.

HABITAT.—Lanzarote, Canary Islands.

The original description is inadequate: "Glabrum, tortuosum, foliis subovoideis, floribus breviter pedicellatis in cymam anfractam bipartitam terminalem scorpioideam bracteata dispositis; sepalis 5, obtusis; staminibus 10." It is stated to come near *S. nudum* but to "differ widely in habit," and attention is called to the "cymes remarkably wavy, almost recalling the arched internodes of *Ranunculus reptans* L." As regards habit, *S. nudum* in Madeira forms small tangled shrubby masses, but in cultivation (e.g., old plants at Kew) it is herbaceous and nearly prostrate, with ascending branches, and is indistinguishable in growth-form from *lancerottense*. In leaf *nudum* varies somewhat as regards shape and colour, and I find no character to separate the two plants. The best diagnostic features, as stated above lie in the sepals and scales. In my plants, too, the petals are more acute and of a clearer yellow colour.

Dr. G. V. PEREZ, of Teneriffe, kindly had this plant searched for in Mr. MURRAY'S station—"in rupibus abruptis el Risco dictis in Lanzarote"—and sent living specimens. The spot where these plants were collected is described as south-west of the rock called La Chachara, which stands 500 mètres north-west of the chapel of Las Nieves, Famara, Lanzarote.

122. *Sedum japonicum* Siebold (fig. 149).

S. japonicum Siebold ex Miquel in "Annales Mus. Bot. Lugduno-Batavae," 2, 156, 1855-6. Maximowicz in *Bull. Acad. S. Pétersbourg*, 29, 151, 1883.

ILLUSTRATIONS.—Makino, "Illustr. Flor. Japan," pl. 51. Regel "Gartenflora," 1866, tab. 513, figs. 3, 4.

This plant is in cultivation in Japan, at least in its var. *senanense* Makino, and deserves, therefore, a brief description in the present paper. It is a yellow-flowered species, with stems and leaves recalling those of *S. album*. These points, in conjunction with its long, unequal, blunt, narrow sepals and stellate fruit, will separate it from any other species found in cultivation. MASTERS (*loc. cit.* p. 463) includes it in his

account of the cultivated Stonecrops, but states that he had not seen it, and, as the name is sometimes applied in catalogues to other species, the plant cannot be accepted as formerly in English gardens. The



FIG. 149.—*S. japonicum* Siebold.

following description is condensed from MIQUEL and MAXIMOWICZ (*loc. cit.*) and the figure is taken from Makino (*loc. cit.*).

DESCRIPTION.—A glabrous, creeping, evergreen perennial. *Stems* rooting below, round, smooth, with ascending barren and flowering branches, 4 to 6 inches high, the former usually the taller. *Leaves* alternate, $\frac{1}{4}$ inch long, twice as long as the internodes, linear-oblong, obtuse, sessile, semiterete, shortly spurred. *In-*

florescence a terminal, flattish cyme of 2 to 3 forked branches with flowers in the forks, $1\frac{1}{2}$ to 3 inches across, with bracts resembling the leaves, but smaller. *Flowers* yellow, $\frac{1}{2}$ inch across, on short thick pedicels. *Sepals* green, spreading, linear-oblong, obtuse, shortly spurred. *Petals* yellow, oblong-lanceolate, acuminate, 1-nerved, patent, $\frac{1}{2}$ longer than the sepals. *Stamens* slightly shorter than the petals, the epipetalous ones inserted $\frac{1}{4}$ way up from the base, and shorter than the episepalous ones, anthers yellow. *Carpels* spreading, connate at base, thrice as long as the slender styles, patent in fruit.

HABITAT.—E. China, Japan.

Var. *senanense* Makino in *Bot. Mag., Tokyo*, 19, 67, 1905.

SYNONYM.—*S. senanense* Makino in *Bot. Mag., Tokyo*, 16, 213, 1902.

Differs from the type in its much smaller leaves, more slender stems, being much suffused with red &c., and is a Japanese alpine form of the species.

The type is stated by MIQUEL to flower in July, while the variety flowers (in Tokyo) in May. Both appear to be frequent in Japan.

123. *Sedum alpestre* Villar (fig. 150).

S. alpestre Villar, "Prospectus Plant. Dauph.," 49, 1779; "Hist. Plant. Dauph.," 3, 684, 1789.

SYNONYM.—*S. repens* Schleicher.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 58. Hallier, "Flor. Deutschland," 26, pl. 2651. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 26.

A tiny, rather dull, plant, easily known by its bright-green flattened leaves, rather broader towards the tip, and few terminal inconspicuous



FIG. 150.—*S. alpestre* Villar.

greenish-yellow flowers with erect petals. Of no horticultural value, it is only occasionally found in cultivation. I saw it at Berlin (from the Riesengebirge), and Bremen (from the Carpathians), and Mr. E. BOWLES sent it to me from the Alps and Apennines. Named *alpestre* from its mountain habitat.

DESCRIPTION.—Minute evergreen perennial, glabrous, bright green. *Stem* creeping, with ascending barren and flowering shoots. *Leaves* oblong-obovate, flattened, very fleshy, blunt, tapered and slightly spurred below, larger and more crowded at the ends of the shoots; barren shoots short, with leaves forming rosettes at their ends; flowering shoots taller (2 to 3 inches). *Flowers* $\frac{3}{16}$ inch long, several together at the summit of the stems. *Sepals* resembling the leaves,

green, fleshy, nearly erect, broadest near the very blunt tip, tube very short. *Petals* greenish yellow, $1\frac{1}{2}$ times the sepals, ovate, blunt, erect. *Stamens* equalling the sepals, filaments green, anthers yellow. *Carpels* green, at first erect, spreading widely in fruit.

Flowers June. Hardy.

HABITAT.—Mountains of Central and Southern Europe and Asia Minor.

124. *Sedum Douglasii* Hooker (fig. 151).

S. Douglasii Hooker, "Flora Bor. Amer." 1, 228, 1832.

SYNONYM.—*S. himalense* or *himalaicum* of many gardens (not *S. himalense* of Don, for which see p. 51).

Sedum Douglasii recalls in its narrow, very fleshy leaves and golden-yellow flowers the difficult *rupestre* group which, though mainly European, has a representative in North America (to which region the present species belongs) in *S. stenopetalum*. But in its stellate fruit it differs so widely from the members of that group that it can hardly be included with them. As it is often confused with one or other of the *rupestre* section, some simple diagnostic characters may be mentioned. From *S. stenopetalum* the flattened leaves, the shaggy clothing of withered leaves on the middle portion of the shoots, and the short proliferous branches on the flowering stems distinguish the present species. *S. reflexum* and *S. rupestre* are separated by their creeping character, linear leaves, and inflorescence drooping and convex when young. *S. altissimum* has taller flowering stems, whitish flowers, and, like *reflexum*, has no persistent withered leaves nor proliferous buds on the flowering-shoots. *S. anopetalum* is separated by its creeping habit, long sepals, and absence of withered leaves and proliferous shoots.

DESCRIPTION.—A small, stout, erect, glabrous, evergreen perennial, green, often tinged red. *Stems* bare below, clothed in middle portion with withered leaves, leafy near top; barren shoots 1 to 3 inches high, erect, slightly branched; flowering stems stout, 3 to 12 inches high, unbranched, leaves more distant, the upper ones with short axillary shoots which persist after the fall of the leaf and ultimately drop off and take root. *Leaves* alternate, crowded, linear to linear-lanceolate, subterete, flattened especially on the upper side, rather acute, $\frac{1}{2}$ – $\frac{3}{4}$ inch long by $\frac{1}{12}$ broad, with a short adpressed membranous spur; those of the flowering stem distant, linear-lanceolate, blunt. *Inflorescence* a compact, leafy cyme with about 3 stiff, stout, straight, few-flowered branches and a flower in the fork. *Buds* acute, ribbed, ovate. *Flowers* sessile, bright yellow, $\frac{1}{4}$ to $\frac{5}{8}$ inch across. *Sepals* yellow, ovate, acute, not fleshy. *Petals* 4 times the sepals, ovate-lanceolate, acute, with an apiculus behind the tip, orange-yellow, wide-spreading, keeled. *Stamens* yellow, spreading, slightly shorter than the petals. *Scales* quadrate, short, yellow. *Carpels* erect, later spreading, greenish yellow, shorter than the stamens; stellate-patent in fruit.

Flowers June–July. Hardy.

HABITAT.—Western N. America from British Columbia to California and Montana.

Not infrequent in English gardens, generally under the quite erroneous name of *himalense*.

The specific name commemorates David Douglas (1798-1834),

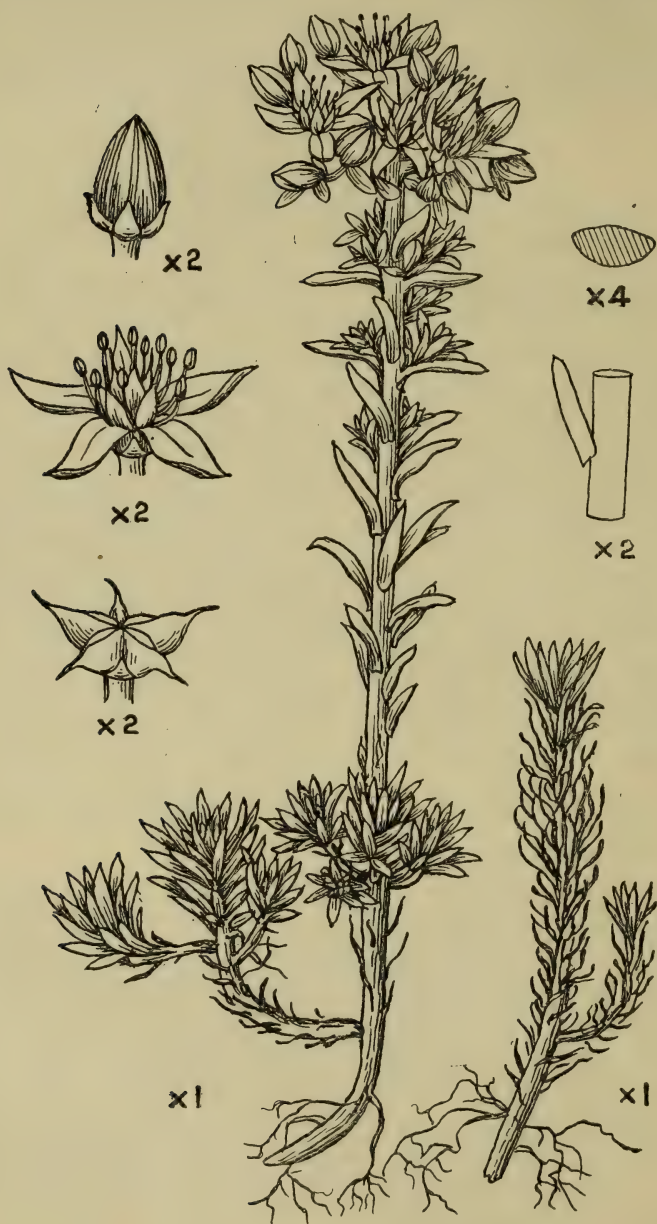


FIG. 151.—*S. Douglasii* Hooker.

who collected in North America under the auspices of the Royal Horticultural Society, and introduced many American plants into England.

125. *Sedum multicaule* Wallich (fig. 152).

S. multicaule Wallich, "Catalogue" No. 7232. Hooker fil. and Thoms. in *Journ. Linn. Soc., Bot.* 2, 102. Clarke in Hooker, "Flor. Brit. India," 2, 422. Hamet in *Bulletin Soc. Bot. France*, 56, 47.

A small, unattractive species, with leaves resembling those of the *reflexum* group, and small dull yellow flowers. A common plant in the Himalayan region &c., not worth cultivation. Among the *Sedums* in cultivation it comes nearest to *S. trullipetalum* H. f. and T. and *S. Celiae* Hamet, but these have leaves only half as large ($\frac{1}{4}$ inch long, not $\frac{1}{2}$ inch). *S. trullipetalum* has, moreover, whitish-yellow clawed petals, and *S. Celiae* has not the stellate fruit characteristic of *multicaule*.

DESCRIPTION.—A small, glabrous perennial (in cultivation, often annual). *Stems* usually branched below, branches ascending, 3 to 4 inches high, smooth, round, leafy. *Leaves* alternate, sessile, shortly and bluntly spurred, apiculate, linear, very fleshy, flat on face, rounded on back, about $\frac{1}{2}$ inch long by $\frac{1}{16}$ inch broad. *Inflorescence* leafy, about 2 inches across, of several wide-spreading scorpoid branches, with a flower in the centre. *Buds* ovate, acute. *Flowers* sessile, $\frac{3}{8}$ inch across. *Sepals* resembling the leaves, very unequal, linear, apiculate, fleshy, green, the shortest equalling the petals, separate nearly to the base. *Petals* yellow, ovate-lanceolate, apiculate, inconspicuous. *Stamens* slightly shorter than the petals, filaments green, anthers yellow. *Scales* whitish, emarginate. *Carpels* green, at first erect, later wide-spreading; fruit stellate, often crimson.

Flowers July–August. Hardy.

HABITAT.—Himalayas, China, Japan.

Usually much branched below. Young plants were received from Edinburgh (grown from Himalayan seed), and seed received from Darjeeling Botanic Garden. There is an excellent unpublished coloured figure of the plant in the Kew collection of drawings, made by Mrs. GEORGE GOVAN, circa 1823–32.

Described by HAMET, who has made a special study of the plant (*loc. cit.*), as perennial, but during a period of several years the plant in my garden, even when protected in winter, behaved as an annual, making no barren shoots, dying in autumn, and sowing itself freely.

The name *multicaule*—many-stemmed—refers to its branching habit.

126. *Sedum trullipetalum* H. f. and T.

S. trullipetalum Hooker fil. and Thoms., in *Journ. Linn. Soc., Bot.*, 2, 102, 1858. C. B. Clarke in Hooker, "Flor. Brit. India," 2, 421. Hamet in *Bulletin Soc. Bot. France*, 56, 47.

A small moss-like plant related to *S. multicaule* Wallich, *S. Celiae* Hamet (both of which are described and figured in the present paper) and others of the Japonica group. It differs from *multicaule* in its leaves half as large with a three-lobed (not entire) spur, petals clawed, obtuse, mucronate, nearly $\frac{5}{16}$ inch long (instead of not clawed,

acuminate, $\frac{3}{16}$ inch long), &c., from *Celiae* in its larger whitish-yellow



FIG. 152.—*S. multicaule* Wallich.

(not greenish - yellow) flowers with clawed (not ovate-lanceolate) petals, &c.

DESCRIPTION.—A very small, moss-like, glabrous perennial. *Roots* fibrous. *Stems* procumbent or erect, much branched, very leafy, the barren shoots short,

the flowering ones branched below, $2\frac{1}{2}$ –3 inches long. *Leaves* alternate, sessile, imbricate, linear, entire, acuminate, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, broadening at the base into a 3-lobed spur. *Inflorescence* corymbose, dense, up to 1 inch across, bracts resembling the leaves. *Flowers* whitish yellow, $\frac{1}{2}$ inch across, nearly sessile. *Sepals* broadly lanceolate, acute. *Petals* slightly exceeding the sepals, $\frac{5}{16}$ inch long, clawed; claw linear, a little shorter than the ovate, acute, mucronate, keeled lamina. *Stamens* 10, about $\frac{2}{3}$ the petals, the epipetalous ones inserted a little less than half way up the petal. *Scales* a little longer than broad, retuse. *Carpels* a little shorter than the stamens, connate in the lower half, styles slender.

Flowers September. Hardy.

HABITAT.—Himalayan region; Yunnan.

A little, mossy, pale-flowered Sedum of no horticultural interest. My plants, which came from the Lloyd Botanic Garden, Darjeeling, died off badly in autumn just before flowering, and proved difficult to keep. The description of the floral parts given above is drawn largely from HAMET's excellent account.

Hooker and Thomson call the species annual, and HAMET perennial. My plants persisted for three seasons, but, though barren stems were present, almost the whole perished in early autumn, only a few small buds—whether terminal or axillary I cannot say—remaining till spring, when they rooted and grew.

127. *Sedum Celiae* Hamet (fig. 153).

S. Celiae Hamet in *Bulletin de Géographie Botanique*, 23, 67, 1913.

A minute, green, spiny-leaved species allied to the well-known Himalayan (and Chinese) *S. multicaule* Wall., and forming one of a quite large group of small linear-leaved species of the Japonica section now known to occur in China. None of its allies except *multicaule* and *trullipetalum* are in cultivation. The first differs from it in its stellate fruit, much larger leaves, &c., the second in its dense inflorescence, whitish-yellow clawed petals, &c.

DESCRIPTION.—Perennial, minute, glabrous, bright green, creeping, about 2 inches high. *Stem* creeping, slender, smooth, round, reddish, barren and flowering ones similar, each with many short ascending branches, their lower part loosely clothed with old leaves. *Leaves* alternate, crowded, sessile, linear or slightly tapering, entire, acuminate, spine-pointed, thick (fig. 153, *b*), $\frac{1}{4}$ inch long by $\frac{1}{8}$ inch wide by $\frac{1}{16}$ inch thick, at base colourless with a median purple stripe or blotch, spur short, usually rounded, sometimes 3-lobed (fig. 153, *a*, *a*), occasionally deeply 3-lobed. *Cymes* lax, of 2 or 3 short, wide-spreading branches round a central flower, about 1 inch across, flat, leafy, with bracts forming a rough involucre round the base of the calyx of each flower. *Buds* ovate, acute, whitish, with green ribs in the upper part, the corolla exceeded by the long, green, erect sepals. *Flowers* sessile, rather greenish yellow, not opening widely, about $\frac{1}{4}$ inch across. *Sepals* lanceolate, acute, leaf-like, scarcely spurred, semi-erect, slightly exceeding the petals (or slightly shorter than them—R. Hamet). *Petals* yellow, ovate-lanceolate, acute, semi-erect, $\frac{3}{8}$ inch long, with a dorsal rib ending in a short apiculus behind and slightly exceeding the tip (fig. 153, *c*). *Stamens* a little shorter than the petals, filaments tapering, yellow, anthers reddish purple, the epipetalous ones inserted about $\frac{1}{4}$ from the base. *Scales* yellow, the lower half broadly linear, twice as long as broad, the upper half roundish, emarginate, broader than long. *Carpels* slender, erect, free save at the very base, slightly shorter than the stamens, pale green, tapering into slender erect styles. Seeds attached to a small, semiglobular placenta placed near the base of the inner face of the carpel (fig. 153, *d*). *Carpels* erect in fruit, slightly exceeded by the erect sepals.

Flowers August–September (gentle heat). Not hardy.
 HABITAT.—Yunnan.



FIG. 153.—*S. Celiae* Hamet.

A single plant appeared at Glasnevin among other seedlings grown from seed collected by Rev. E. E. MAIRE in 1915 at and about Tong-tchouan, altitude 2,900 mètres. The species was described by R. HAMET from material (in the Paris Herbarium) obtained by the same collector in the same locality.

The Glasnevin plant, from which my description was drawn up, agrees satisfactorily with HAMET's account of the species. The following differences may be noted. The spur is, according to HAMET, entire and blunt; while usually so in my plant, it is sometimes slightly, or even markedly, 3-lobed; and the flowers in my plant are sessile, not shortly pedicellate. With regard to the former character, it is not constant in several Chinese species; and the presence or absence of pedicels is to some extent dependent on the conditions of shade or exposure in which a plant grows; sessile flowers are often *potentially* pedicellate. The peculiar form of the placenta in *S. Celiae*—a semiorbicular mass placed near the base of the inner face of the carpel, instead of a ribbon running the length of the inner face, as is usual in the genus—is found in several other small Asiatic Sedums—*S. Przewalskii* Maximowicz, *S. Fedtschenkoi* Hamet, and *S. Seelemanni* Hamet.

Named after Mdlle. Alice Leblanc (by inversion of the Christian name).

128. *Sedum multiceps* Coss. and Dur. (fig. 154).

S. multiceps Cosson and Durieu in *Bulletin Soc. Bot. France*, 9, 171, 1862. Masters in *Gard. Chron.* 1878, ii. 717.

ILLUSTRATIONS.—Cosson, "Illustr. Flor. Atlant." 2, tab. 131. *Gard. Chron.*, 1876, ii. fig. 45, repeated 1878, ii. fig. 120.

Unmistakable among the linear-leaved hardy Sedums by reason of its shrubby growth. In winter the leaves fade, all except the uppermost, and form a shaggy covering on the stem. Flowers rather sparingly.

DESCRIPTION.—A small subdeciduous, much branched, bushy plant, 3 to 4 inches high. *Stems* grey, smooth and rooting below, shaggy with withered leaves in the middle portion, densely leafy above, branches ascending or wide-spreading. *Leaves* green, sessile, alternate, very crowded, linear-oblong, blunt, flat on face, finely papillose on the edges and on the rounded back, very fleshy, $\frac{1}{4}$ inch long. *Inflorescence* a small, few-flowered, 3-parted cyme, borne on an erect flower-shoot 1-2 inches long with small, comparatively distant, leaves. *Buds* ovate, acute, ribbed. *Flowers* nearly $\frac{1}{2}$ inch across, sessile, usually 5-merous. *Sepals* green, fleshy, linear, blunt. *Petals* yellow, oblong-lanceolate, apiculate, wide-spreading, twice the sepals. *Stamens* yellow, spreading, shorter than the petals. *Scales* small, yellowish. *Carpels* greenish-yellow, equalling the stamens, at first erect, wide-spreading in fruit.

Flowers July. Hardy.

HABITAT.—Algeria.

Not infrequent in cultivation, and usually correctly named.

The name *multiceps*—many-headed—refers to its branching habit.

129. *Sedum sexangulare* Linn. (fig. 155).

S. sexangulare Linn., "Species Plantarum," 432, 1753. Masters, *Gard. Chron.* 1878, ii. 685.

SYNONYMS.—*S. mite* Gilibert, "Flora Lithuan.," 5, 192. *S. bolontense* Loisel. in Desv. *Journ. Bot.* 2, 327, 1809; "Not.," 17. *S. Hillebrandii* Fenzl.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 118. Curtis, "Flora London." 3, pl. 113. Sowerby, "English Bot." ed. 3, pl. 533. Reichenbach, "Flora German." 23, tab. 57. Zenker, "Flor. Thuringen," 5, tab. 579.

A European species long cultivated in gardens, and sometimes run wild in areas where it is not indigenous. It makes a fine mass

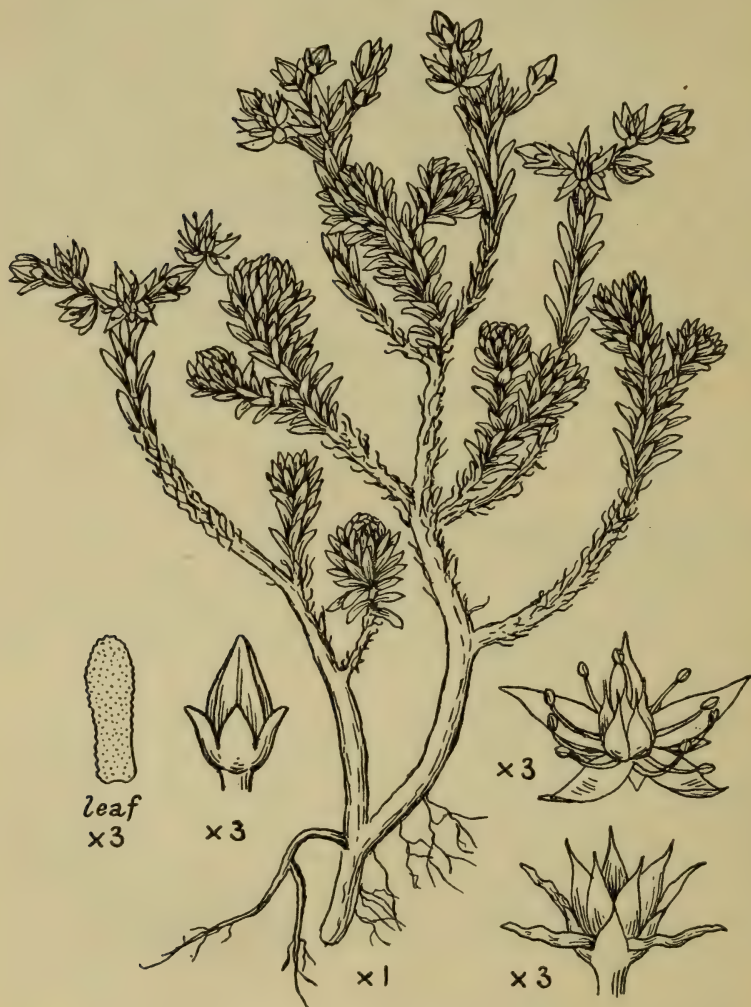


FIG. 154.—*S. multiceps* Coss. and Dur.

of golden-yellow when in bloom, resembling *acre* at a distance, but the flowers are smaller and the leaves very different, being linear and arranged in six spiral rows, not triangular with a broad base. In foliage it somewhat resembles *S. Lydium* and *S. gracile*, but both of these have white flowers. Occasionally the characteristic spiral arrangement of the leaves is absent. Usually correctly named in gardens.

DESCRIPTION.—A small, evergreen, glabrous perennial, forming a fresh green mat. *Stems* creeping, much branched, barren shoots many, ascending, 1 to 2 inches long, flowering shoots a little taller. *Leaves* on barren shoots crowded, linear, blunt, terete, spreading, spurred, $\frac{1}{8}$ to $\frac{1}{4}$ inch long, usually in 6 spiral rows; those of flowering shoots similar, less crowded. *Inflorescence* a flat-topped cyme 1 to 2 inches across, of 3 branches with a flower in the fork. *Buds* ovate, acute. *Flowers* $\frac{3}{8}$ inch across. *Sepals* green, lanceolate, blunt, lobes longer than the tube, persistent in fruit. *Petals* yellow, linear-lanceolate, acute, wide-spreading, twice the sepals. *Stamens* yellow, spreading, shorter than the petals. *Scales*



FIG. 155.—*S. sexangulare* Linn.

small, yellow. *Carpels* yellow, erect, tapering into the styles, equalling the stamens, spreading in fruit.

Flowers July. Hardy.

HABITAT.—Widespread in Europe. Naturalized in some places in England.

The specific name refers to the arrangement of the leaves in six rows.

130. *Sedum rupestre* Linn. (figs. 156, 164, a).

S. rupestre Linn., "Species Plantarum," 431, 1753. Baker in *Gard. Chron.* 1877, ii. 307. Masters, *ibid.*, 1878, ii. 658.

SYNONYMS.—*S. elegans*, Lejeune, "Flore de Spa," 1, 205, 1811. *S. pruinaum* of many British and Continental authors (not of Brotero, for which see p. 277).



FIG. 156.—*S. rupestre* Linn.

ILLUSTRATIONS.—Sowerby, "English Bot." ed. 3, pl. 536. Reichenbach, "Flor. German.," 23, tab. 61.

This common plant, though variable, can without difficulty be separated from its allies of the *rupestre* section. The inflorescence drooping in bud separates it from all but *reflexum*; the leaves flat on face divide it from *reflexum* and *anopetalum*; the subglobular young inflorescence is shared only by *reflexum* and *altissimum* among its allies. In its stems, shaggy below with withered leaves, it is matched only by *Douglasii*.

DESCRIPTION.—An evergreen creeping perennial, forming a mat, usually glaucous. *Stems* creeping, much branched, branches ascending, shaggy with withered leaves below, densely leafy above; barren branches short with ascending tips, flowering branches with less crowded leaves, 6 to 12 inches high, drooping in bud. *Leaves* of barren shoots linear to linear-oblancoelate, $\frac{1}{2}$ to $\frac{3}{4}$ inch long by $\frac{1}{16}$ inch broad, sessile, apiculate, fleshy, flattish on face, rounded on back, very crowded towards the tip of the shoots, where they form dense rosettes; those of the flowering shoots lanceolate, ascending, more distinctly spurred. *Inflorescence* an umbellate cyme of about 5 forked branches with a few bracts at the primary branching; subglobose in bud owing to the reflexure of the branches, flattish in full flower, hollow-topped in fruit owing to the straightening out and growth of the branches. *Buds* oval, with straight sides, strongly ribbed. *Flowers* nearly $\frac{1}{2}$ inch across, mostly 5- (often 6- to 8-) parted, pedicels slender, shorter than the flowers. *Sepals* triangular, longer than broad, nearly free; only slightly fleshy, green, persistent in fruit. *Petals* oblong-linear, blunt, concave, golden yellow, wide-spreading, more than twice the sepals. *Stamens* yellow, spreading, equalling the petals. *Scales* small, yellow, quadrate. *Carpels* yellow, erect in flower and fruit.

Flowers July. Hardy.

HABITAT.—West Europe, from Spain to Germany. Naturalized in some parts of the British Isles, where it is an old and familiar garden plant; possibly native in the west.

Though not so variable as its near ally *S. reflexum*, it shows a considerable range as regards size and colour. The plant is always recognizable by its crowded linear leaves *quite flat* on the upper surface. In size it ranges from robust to slender and about half the size (var. *minus* auct.), and in colour from purple-glaucous tipped with red to uniform green. The var. *Forsterianum* (*S. Forsterianum* Smith, "English Bot." 26, pl. 1802) is a slender green form with inflorescence rather round-topped instead of flat. In a large series of cultivated forms which I got together in my garden, the green forms were all of small size, and so far agreed with *Forsterianum*, but the inflorescence character was not constant. The smallest forms which I met with were glaucous like the type.

Rouy and Camus ("Flore de France," 7, 111) admit several varieties (*Lejeunii*, *aureum*, *Trevirens*), in which the principal character is the shape of the barren shoot; but this depends largely on questions of soil, situation, and condition, as the leaves tend to extend widely in shade or moisture, and to close up into a dense, egg-shaped mass in exposure or drought; so the shape of the shoots is an awkward character to use for diagnostic purposes. For ordinary purposes var. *Forsterianum* (the small slender green form) and var. *minus* (glaucous like the type but much smaller in all its parts) alone seems worth distinguishing.

At *a*, in fig. 156, is shown a barren shoot during drought, with the leaves incurved. At *b* is shown the same shoot after a subsequent short spell of wet weather:

The specific name refers to its preference for a rocky habitat.

131. *Sedum reflexum* Linn. (figs. 157, 164, *b*).

S. reflexum Linn., "Species Plantarum," ed. 2, 618, 1762, in part.
Baker in *Gard. Chron.* 1877, ii. 461. Masters, *ibid.* 1878, ii. 658.

SYNONYM.—*S. rupestre*, Linn., *loc. cit.*, in part.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 116. Sowerby, "English Bot." ed. 3, pl. 534. Reichenbach, "Flor. German.," 23, tab. 60. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 29.

This variable plant may be distinguished from the other members of the *rupestre* group by its possessing the following combination of characters: stem creeping (which excludes *Douglasii* and most forms of *stenopetalum*), leaves terete (excludes *stenopetalum*, *rupestre*, *altissimum*, *pruinatum*), young inflorescence subglobular (excludes all but *rupestre* and *altissimum*) and drooping (excludes all but *rupestre*), fruiting inflorescence cup-shaped (excludes all but *rupestre* and *altissimum*), flowers golden yellow (excludes *altissimum*, *pruinatum*, and most forms of *anopetalum*). It will be noted that in the characters chosen *rupestre* shows the most frequent agreement with *reflexum*; but the leaves of *rupestre*, quite flat above, will always distinguish it from the former.

DESCRIPTION.—A creeping evergreen perennial, forming a loose mat. *Stems* rooting below, ascending; barren shoots many, 1–4 inches long, round, smooth, leafy; flowering shoots 6–12 inches, unbranched, leaves more distant. *Leaves* crowded, green or glaucous, $\frac{1}{2}$ inch long, sessile, shortly spurred, linear, acute, nearly terete, ascending or recurved. *Inflorescence* a dense convex or flattish cyme, 1–1 $\frac{1}{2}$ inch across, of 3 to 5 forked branches with flowers in the forks; drooping and subglobose in bud, hollow-topped in fruit. *Buds* ovoid, blunt, ribbed. *Flowers* 5- to 7-parted, shortly stalked, $\frac{5}{8}$ inch across. *Calyx* cup-shaped, green, fleshy, persistent in fruit, lobes ovate-lanceolate, acute, tube very short. *Petals* bright yellow, linear-lanceolate, acute, keeled on back, grooved on face, wide-spreading, twice the sepals. *Stamens* yellow, spreading, shorter than the petals. *Scales* yellow, quadrate, notched. *Carpels* yellow, erect, equalling the stamens, tapering into the long slender styles.

Flowers July. Hardy.

HABITAT.—W., N., and Central Europe. Naturalized on old walls and occasionally on rocks in many parts of the British Isles.

One of the commonest of European Sedums both in the native state and in gardens, whence it often migrates to rocks and walls in districts where it is not indigenous. Its wide distribution in gardens and power of spreading, combined with a considerable variation in form and a similarity to several other species, have led to much confusion, and it is to be found grown under many erroneous names. As an instance of the confusion which exists among the Sedums as found in gardens, some of the names under which *S. reflexum* arrived from reputable sources may be quoted: *Alberti*, *alpestre*, *elongatum*,

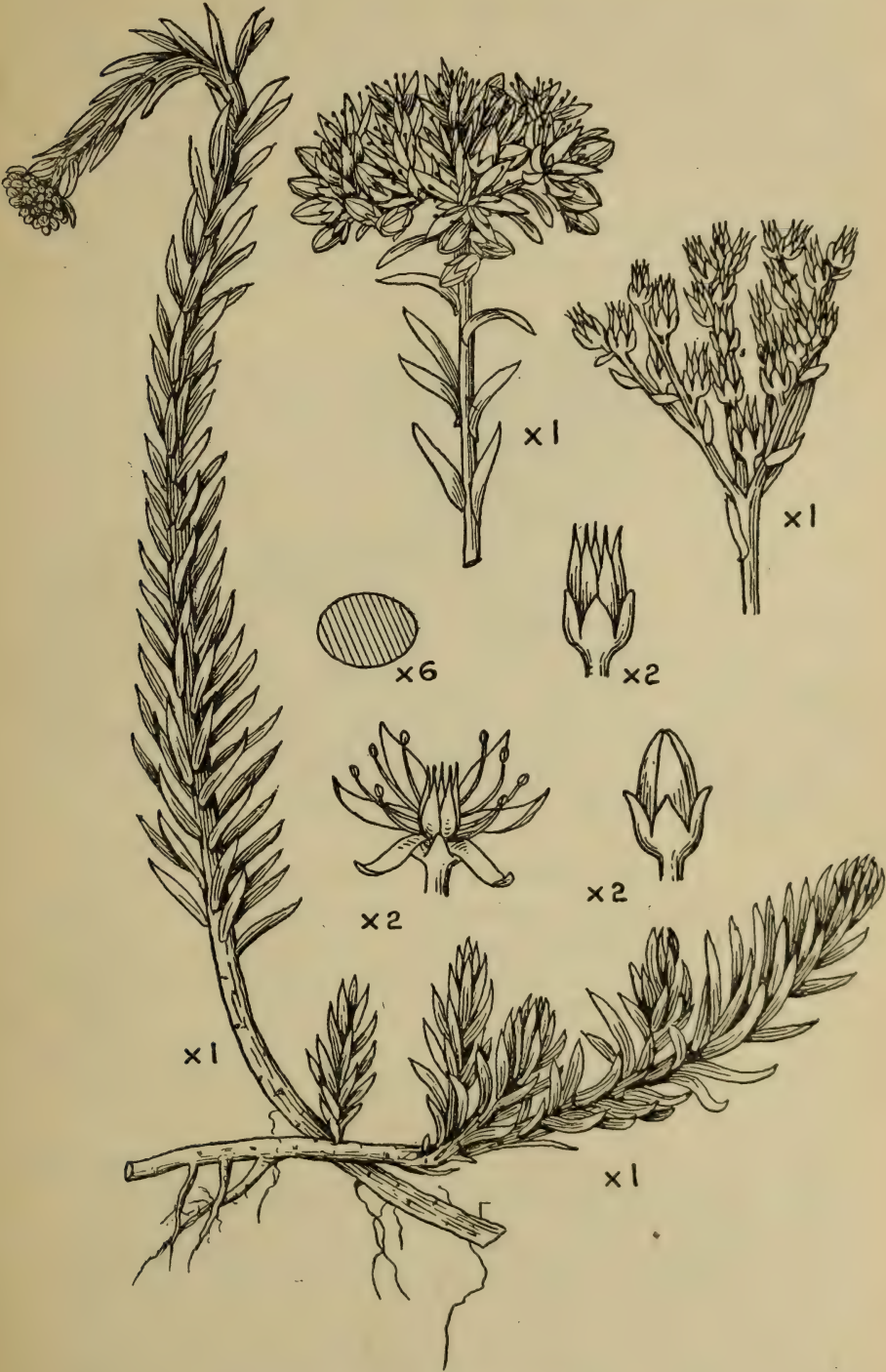


FIG. 157.—*S. reflexum* Linn.

grandiflorum, *hispanicum*, *Hildebrandtii*, *ibericum*, *Jacquini*, *lividum*, *montanum*, *portulacoides*, *pruinatum*, *stoloniferum*, *Verloti*.

I have cultivated about a hundred plants of this species, from gardens in most parts of Europe, including many selected forms from British gardens. This large series showed a considerable and continuous range of variation as regards size (from very robust forms down to others indistinguishable without flower from *S. anopetalum*) and colour (from glaucous to quite green). The species varies also as regards the character from which it takes its name—the reflexed leaves on the flowering stems, these being often straight. The colour of the flowers in the cultivated forms appears to be always normal—a fine yellow.

Var. *albescens* Haworth, "Revis. Succ." 28, which figures in British floras, is described as having the leaves glaucous, those of the flowering shoots not reflexed, plant smaller and leaves more slender, and flowers pale yellow. In the last character alone does it seem to differ from all of my garden forms, many of which showed some of these characters, and several all of them except the last.

Many other varieties are described. BAKER, in his account of the Sedums of the *rupestre* group (*Gard. Chron.* 1877, ii. 461), includes vars. *collinum*, *virens*, *albescens*, *minus*, *recurvatum*, *septangulare*, *virescens*, and *cristatum*, and ROUY and CAMUS ("Flore de France," 7, 109) give *adpressum*, *collinum*, *recurvatum*, *graniticum*, *reflexum* Briq., *arrigens*, *Smithianum*, *albescens*, and *caesium*; but a series such as that in my garden disillusions one as to the value of these, except so far as, in the native state, they may represent local races, and be of interest geographically. For garden purposes the only one requiring mention is

Monstr. *cristatum* of gardens (fig. 158),

a fasciate form long in cultivation, and one of the most curious of Sedums, the flattened stems often being 2 inches broad. In this condition it never flowers, but normal shoots are frequently produced, and these flower freely if allowed to develop.

132. *Sedum altissimum* Poiret (figs. 159, 164, d).

S. altissimum Poiret, "Encycl.," 4, 634, 1796.

SYNONYMS.—*S. ochroleucum* Villar (not of Chaix, which = *anopetalum*), Baker in *Gard. Chron.* 1877, ii. 307. *S. acutifolium* of gardens (not of Ledebour, which is a white-flowered Caucasian species allied to *album*, and not in cultivation). *S. rufescens* Tenore.

ILLUSTRATIONS.—Jacquin, "Hort. Vindob.," 1, tab. 81 (as *Sempervivum sedi-forme*). De Candolle, "Plantes Grasses," tab. 40. Tenore, "Flor. Napol.," tab. 41. Reichenbach, "Icon. Crit.," 3, 285. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 32.

S. altissimum most resembles, on the whole, *S. reflexum*, from which it may be distinguished by its leaves distinctly flattened (not terete) and lanceolate (not linear) in outline, by its taller flowering shoots

which are erect (not drooping) in bud, and by its whitish (not bright yellow) flowers. The leaves are more conspicuously acute than in any other species of the section, and end in a little, thorn-like point. In the peculiar greenish-white tint of the flowers it matches *S. anopetalum*, as also in its acute leaves and inflorescence erect in bud; but the latter has leaves and flower stems of only half the length, the leaves are linear and terete, and the inflorescence flat, not subglobular, in bud.

The plant varies much in size and colour, from robust forms with flower stems two feet high bearing leaves up to $1\frac{1}{2}$ inch long, to



FIG. 158.—*Sedum reflexum* var. *cristatum*.

quite dwarf forms rising only to 6 inches; and as regards colour from pale green or dark green to fine purple-glaucous. The large forms include var. *latifolium* of Rouy and Camus, "Flore de France," 7, 108, which is also the *S. nicaense* of Allioni, "Flor. Pedemont." ii. 122, iii. tab. 90, fig. 1; *S. coerulescens* Haworth in *Phil. Mag.*, 66, 172, 1825, is a small purple-glaucous form.

DESCRIPTION.—Evergreen perennial, glabrous, usually glaucous. *Roots* fibrous. *Stems* decumbent, woody and rooting below, with ascending branches. *Barren shoots* many, very leafy, 3–6 inches high. *Flowering stems* $\frac{1}{2}$ to 2 feet high, unbranched, very erect. *Leaves* of the barren stems alternate, $\frac{1}{4}$ to $\frac{3}{8}$ inch long by $\frac{1}{16}$ to $\frac{3}{16}$ inch wide, flattened, especially on face, linear-lanceolate, acute, spine-pointed, sessile, slightly spurred: those of the flower-stems similar but larger, up to $1\frac{1}{2}$ by $\frac{1}{2}$ inch, more distant, smaller upward. *Inflorescence* a compact, leafless, subglobose cyme of several forked branches with a flower in the forks, erect and globose in bud, very hollow and obconical in fruit. *Buds* oblong, very blunt, strongly ribbed, ribs greenish. *Flowers* $\frac{1}{2}$ inch across, sessile or nearly so, mostly 5-merous. *Sepals* green, fleshy, ovate, acute, tube short. *Petals* $2\frac{1}{2}$ times the sepals, boat-shaped, keeled, oblong-lanceolate, broadest near the

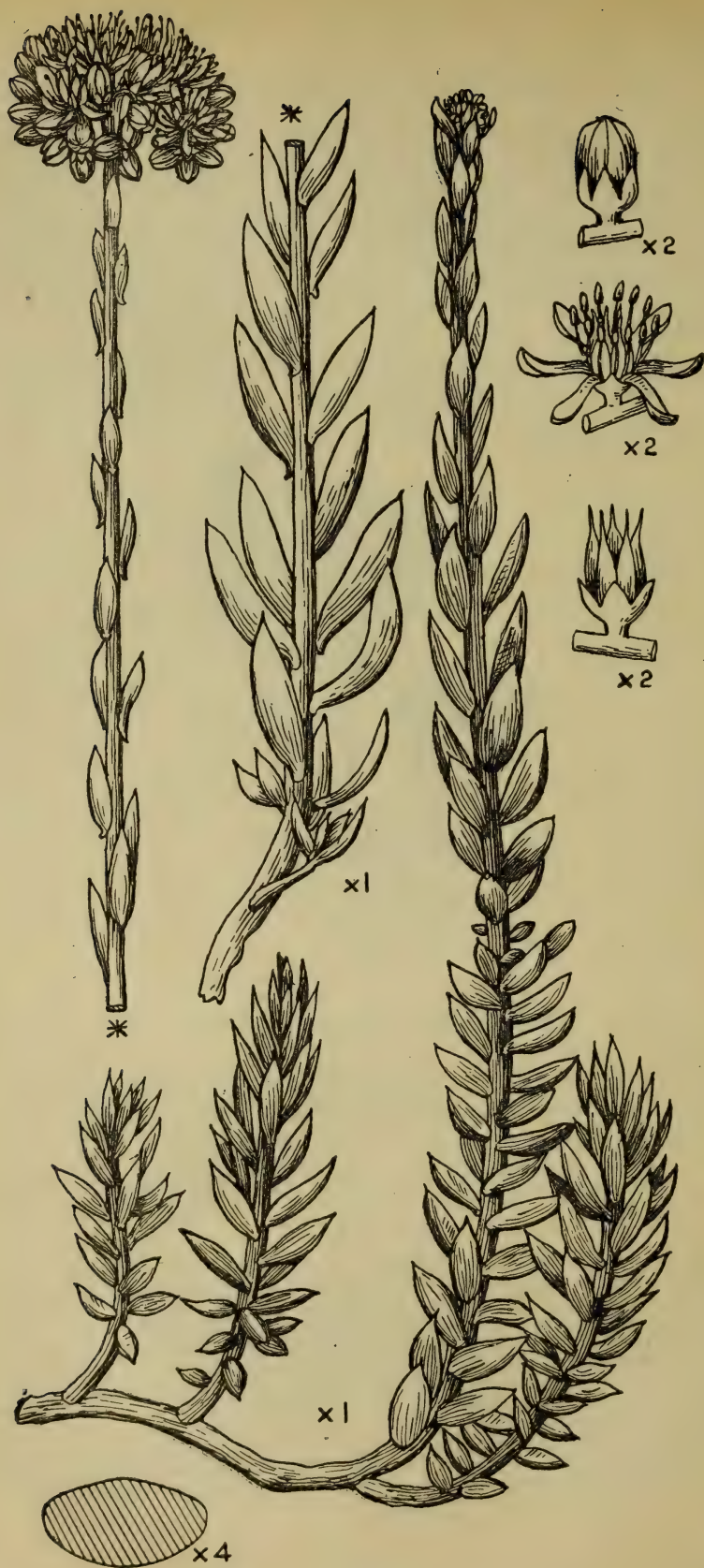


FIG. 159.—*S. altissimum* Poir.

obtuse tip, greenish-white, wide-spreading. *Stamens* slightly exceeding the petals, spreading, filaments greenish, anthers yellow. *Scales* small, quadrate, greenish. *Carpels* erect, slender, greenish, equalling the petals.

Flowers July–August. Hardy.

HABITAT.—S. Europe, N. Africa, Asia Minor. A familiar plant round almost the whole of the Mediterranean basin.

It is suitably named *altissimum* (very tall), the flower-stems being usually longer than those of any other member of the *rupestre* group.

133. *Sedum anopetalum* DC. (figs. 160, 164, c).

S. anopetalum De Candolle "Rapports Voyages," 2, 80, 1808. Baker in *Gard. Chron.* 1877, ii. 462. Masters, *ibid.* 1878, ii. 626.

SYNONYMS.—*S. elongatum* of gardens (not of Wallich, for which see p. 41). *S. ochroleucum* of Chaix (not of Villar, which = *altissimum*, see p. 270).

ILLUSTRATIONS.—De Candolle, "Mém. Crassul.," pl. 8. Reichenbach, "Flor. German.," 23, tab. 59. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 33.

A species well marked when in flower, but without flower often impossible to distinguish from small forms of *S. reflexum*. In bud, flower, or fruit it may be known from all other species of the *rupestre* section by its long lanceolate sepals, which in fruit have the outer face concave. It differs from *rupestre* in its almost terete (not flat) leaves, and from both *reflexum* and *rupestre* in its inflorescence erect in bud. In this latter respect it agrees with *altissimum*, but that species has lanceolate (not linear), flattened, larger leaves. The flowers of *anopetalum* are usually whitish, like those of *altissimum*; but bright-yellow forms, as in *reflexum* and *rupestre*, are not uncommon. The inflorescence remains flat in bud, flower, and fruit, while in *reflexum*, *rupestre*, and *altissimum* it is very convex in bud and very concave in fruit.

DESCRIPTION.—A glabrous, evergreen perennial, creeping, forming a low green or glaucous mat often tinged red. *Stems* many, much branched and rooting below, with ascending barren and flowering shoots, the former 1 to 4 inches, the latter 6 to 9 inches high. *Leaves* of barren shoots crowded, ascending, $\frac{3}{4}$ inch long, linear, apiculate, slightly flattened above, slightly spurred at base, sometimes arranged in 6 or more rows; those of the flowering stems larger, $\frac{3}{4}$ inch long, more distant, more distinctly spurred. *Inflorescence* a flat compact cyme about 1 inch across, of about 5 forked branches with a central flower, leafy, flattish, and erect in bud and in fruit. *Buds* ovate-oblong, ribbed, acute. *Flowers* $\frac{3}{4}$ inch long. *Sepals* long, lanceolate, green, erect, acute, separate nearly to the base, persistent in fruit, when they have a median depression. *Petals* narrowly lanceolate, acute, keeled, grooved on face, erect or spreading, seldom widely open, whitish, rarely bright yellow, twice the sepals. *Stamens* yellow, equalling the petals. *Scales* small, whitish. *Carpels* shorter than the petals, slightly shorter than the stamens; erect, greenish, erect also in fruit; styles divergent.

Flowers June–July. Hardy.

HABITAT.—Central and Southern Europe from Spain eastward; Asia Minor.

Among some fifty selected plants of *anopetalum* in my garden, derived from as many sources, native and cultivated, the following variations are noticeable: (1) *size*, from small forms with barren



FIG. 160.—*S. anopetalum* DC.

shoots a couple of inches long and flower-stems three inches high to strong forms with shoots 9 inches long and flower-stems of a foot ; (2) *leaf-colour*, bright green, dark green flushed with red, or glaucous ; a form brought from Bulgaria by Sir JOSSLYN GORE-BOOTH is so glaucous as to be almost white ; (3) *flower-colour*, this varies less, being either of the typical whitish hue or else golden yellow. Among this variable set I have found it futile to attempt to distinguish varieties, of which several have been described, such as *chrysanthum* and *chloranthum* of JEANBERNAT and TIMBAL-LAGRAVE, and *S. Verlotti* of JORDAN.

Frequent in cultivation but generally under erroneous names or synonyms, such as *collinum*, *elegans*, *elongatum*, *Forsterianum*, *montanum*, *ochroleucum*, *reflexum*, *stenopetalum*, *virens*.

Its name *anopetalum* is descriptive of the characteristic upward direction of the petals.

134. *Sedum stenopetalum* Pursh (figs. 161, 164, e).

S. stenopetalum Pursh, "Flor. Amer. Septent.," 1, 324, 1814. S. Watson, "Bot. of Nevada, Utah, and Colorado," 101, 1871. "N. Amer. Flora," 22, 65. Baker in *Gard. Chron.* 1877, ii. 307. Masters, *ibid.* 1878, ii. 626.

ILLUSTRATIONS.—Britton and Brown, "Illustr. Flora Northern U.S.," 2, 166. Regel, "Gartenflora," tab. 741a. (Both poor.)

The only representative in America of the *rupestre* group which is so characteristic of the European *Sedum* flora. Most resembles *S. reflexum*, but the shoots, though sometimes elongate, do not creep, and are normally very short and erect. The leaves are blunter and of a duller surface ; under the microscope this is seen to be due to the surface being more distinctly cut up into polygonal spaces, in which hemispherical papillæ are often placed ; when the leaves are tinged purple, as is frequent, the colour resides in these prominences. In flower the species differs from *reflexum* in its shorter stem, more flattened leaf, inflorescence erect in bud and flattish in both bud and fruit, and the petals, which are uniformly 5 in number, are much more acute.

DESCRIPTION.—A tufted, glabrous, evergreen perennial. *Stems* few, erect or ascending, barren shoots short (about 1 inch long), leafy ; flowering shoots 4 to 6 inches. *Leaves* scattered, glaucous, or dull green, or flushed dull purple, minutely papillose, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, somewhat flattened, linear-lanceolate, entire, blunt, curved upwards, very shortly spurred, imbricate around the growing point ; those of the flowering stem similar, rather larger, less crowded. *Inflorescence* 1 to 2 inches across, of several forked branches with flowers in the forks, flattish, compact ; in strong plants elongate (3 inches long or more), by production of axillary branches below the main inflorescence. *Buds* ovate-oblong, pointed. *Flowers* short-stalked, $\frac{1}{2}$ inch across. *Sepals* fleshy, lanceolate, rather blunt, pale green, flat on face, rounded on back, separate nearly to the base. *Petals* lanceolate, acute, patent in upper part, bright yellow, grooved on face, with a greenish keel on back, twice the sepals. *Stamens* spreading, shorter than the petals, filaments yellow, anthers orange. *Scales* very small, orange, notched, broader than long. *Carpels* slender, nearly erect, greenish yellow, the tips diverging in fruit.

Flowers early June. Hardy.

HABITAT.—Western and central North America.

Occurs in two forms: (1) the typical form with very short, tufted, barren stems and flower stems 4 or 5 inches long; and (2) with

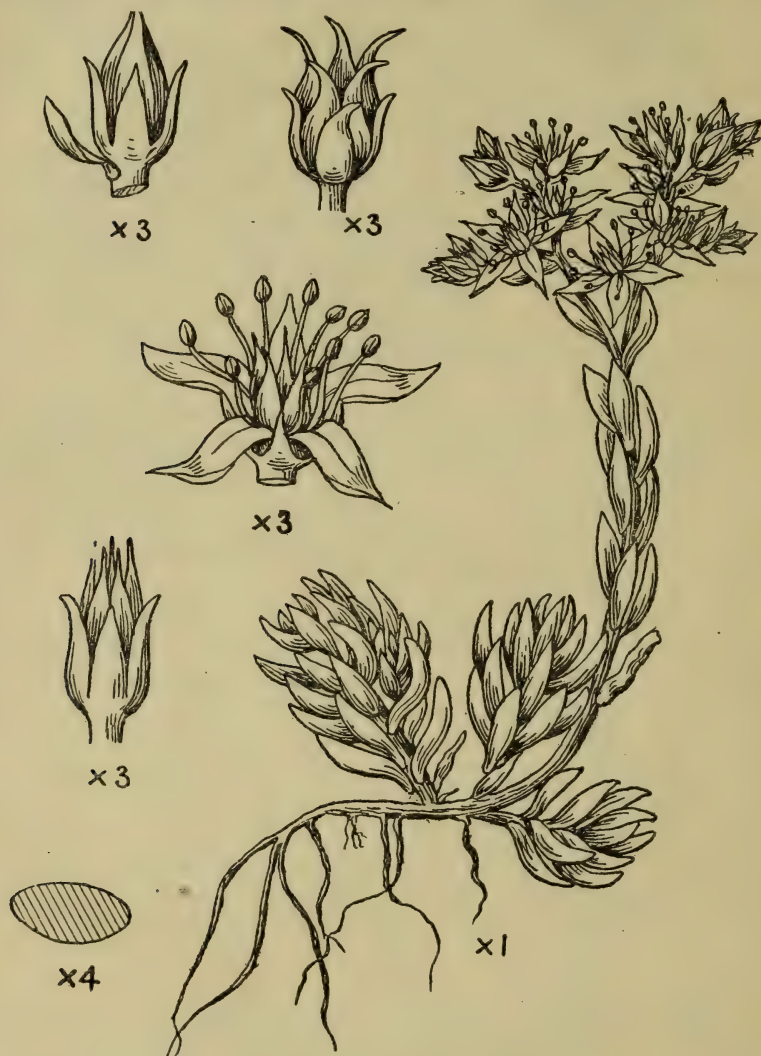


FIG. 161.—*S. stenopetalum* Pursh.

elongate, procumbent stems, barren shoots up to 6 inches long, flower-shoots up to 12 inches long, procumbent below, erect above; whole plant more vigorous, sometimes suffused with dark purplish red.

S. stenopetalum is rather rare in cultivation, but generally correctly named. Collected specimens from British Columbia and Colorado, and many others from gardens in England, Geneva, Lindau, Petrograd, and New York, belong to the typical form. The diffuse form I have

had from several English gardens, and Mrs. HENSHAW tells me she knows it in the wild state in British Columbia.

The name *stenopetalum* signifies narrow-petalled.

135. *Sedum pruina* Brotero (figs. 162, 164, f).

S. pruina Brotero, "Flor. Lusit.," 2, 209, 1804. Mariz in *Boletim Sociedade Broteriana*, 6, 1888, 21. R. P. Murray in *Journ. of Bot.*, 27, 141, 1889. Rouy, "Illustr. Plant. Europ. Rar.," fasc. 10, 77. Praeger in *Journ. of Bot.*, 55, 213, 1917. (Not *S. pruina* of most British and Continental authors, which is *S. rupestre* L. = *elegans* Lejeune.)

ILLUSTRATION.—Mariz, *loc. cit.* tab. 1. Rouy, *loc. cit.* pl. 231.

This interesting and distinct plant has long been confused with the well-known *S. rupestre* L. (= *S. elegans* Lej.), with which, though belonging to the same group, it has little affinity. In its leaves it comes nearest to *S. reflexum*, but in growth it is quite different, and its very distinct inflorescence and flowers place it close to *S. amplexicaule*. While resembling that species, particularly in its few-flowered, two-branched inflorescence and sepals with raised edges and a median depression, it differs widely in its leaves, which have not a broad, clasping base and do not dry up in summer. The very glaucous colour, curious whip-like shoots, rooting only at the tips and dying off behind in autumn, and large straw-coloured flowers distinguish *S. pruina* at a glance when it is growing among its nearest allies.

DESCRIPTION.—A very glaucous, slender, evergreen perennial, with erect, sparingly leafy, flowering stems about 6 inches high, and very long (6 to 9 inches) slender prostrate barren ones, at first leafy, which perish in autumn save for the very leafy tip, which roots. Leaves of the different parts similar, alternate, very glaucous, linear, acute, to $\frac{3}{4}$ inch long, subterete, flattish above, rounded below, with a short adpressed whitish spur; distant, and withering at about flowering-time save at the tips of the barren shoots, where they are crowded, forming a slender, erect, winter bud. Inflorescence lax, 5- to 7-flowered, of two wide-spreading branches with a flower in the fork. Buds oblong, lanceolate, acute. Flowers $\frac{3}{8}$ to $\frac{1}{2}$ inch across, 6- to 7-parted, straw-coloured, on very short pedicels. Sepals tapering from a short tube to a rather acute point, glaucous, slightly recurved, edges somewhat raised on the back. Petals twice the sepals, wide-spreading, linear, acute, strongly keeled on back and channelled on face, $\frac{3}{8}$ inch long, paler on back. Stamens equalling the petals, pale yellow, anthers oblong. Scales very small, bright yellow. Carpels nearly white, erect, slightly shorter than the stamens, tapering into the slender styles.

Flowers July. Hardy.

HABITAT.—Portugal, very rare, chiefly about the Serra de Gerez.

Rev. R. P. MURRAY had it in cultivation in England some thirty years ago. By the kindness of Prof. J. A. HENRIQUES of Coimbra, I received a good gathering of the wild plant in 1914, and about the same time Miss LUCKHAM sent to the Royal Horticultural Society for identification a plant collected by her a few years previously.

Named from the *pruina* or "bloom" (literally hoar-frost) which gives the plant its distinctive glaucous colour.



FIG. 162.—*S. pruinatum* Brotero.

136. *Sedum amplexicaule* DC. (figs. 163, 164, g).

S. amplexicaule De Candolle, "Rapports Voyages," 2, 80, 1808. Baker in *Gard. Chron.* 1877, ii. 462. Masters, *ibid.* 1878, ii. 626.

SYNONYM.—*S. tenuifolium*, DC., "Prodromus," 3, 407.

ILLUSTRATIONS.—De Candolle, "Mém. Crassul.," pl. 7. Sibthorp, "Flor. Graeca," tab. 474. Tenore, "Flor. Nap.," 1, tab. 139, fig. 2. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 35. *Gard. Chron.* 1876, ii. fig. 46.

A very peculiar and interesting species, more closely related to *S. pruinaum* of Portugal than to any of its allies found with it along the Mediterranean. The leaves of the barren shoots fade at about the flowering time in early summer, leaving only the peculiar, broad sheathing bases (fig. 163, c), which enwrap the shoot and presumably form a protection against drought; in this condition the plant looks dead. With the rains of autumn, growth is resumed at the tip of the shoot, and during winter the clump is again covered with small glaucous leaves. Fig. 163, b, shows a shoot in its summer condition, and a, the same shoot when growth is resumed. In the shape and history of its leaves the species is unique. In its flowering parts especially it shows its affinity to *pruinaum*. In both we find the same few-flowered, two-branched inflorescence with large flowers and sepals with a peculiar median furrow; but in *pruinaum* the flowers are usually straw-coloured, not golden, and the furrow less marked than in *amplexicaule*. Wild specimens are sometimes a foot in height when in flower, but in gardens the plant is mostly much smaller, and sometimes minute.

DESCRIPTION.—Small perennial, withering in summer, green for the rest of the year. *Stem* procumbent, wiry, much branched, dying off behind and forming many rooted shoots. *Barren shoots* ascending, 1 to 3 inches long. *Flower-shoots* 2 to 6 inches high, ascending, unbranched. *Leaves* of barren shoots imbricate, glaucous, linear, terete, apiculate, recurved in the upper part, widening at base into a broad, clasping, membranous wing; leaves of flowering shoots linear-lanceolate, apiculate, nearly terete, rather distant, sessile, with a short, narrow, adpressed spur. *Inflorescence* lax, few-flowered, mostly of two wide-spreading branches, each bearing 2 to 6 flowers with a flower in the fork. *Flowers* large, $\frac{3}{8}$ to $\frac{1}{2}$ inch across, 6- to 10-parted. *Buds* nearly $\frac{1}{2}$ inch long, ovate, acute, strongly ribbed. *Sepals* green, ovate-lanceolate, very acute, with a deep median groove, raised edges, and recurved tip. *Petals* golden-yellow, linear-lanceolate, acute, grooved on face, keeled on back, $\frac{3}{8}$ inch long, thrice the sepals. *Stamens* yellow, $\frac{3}{4}$ the petals. *Scales* small, yellow, broader than long. *Carpels* yellow, erect; in fruit erect and large, surrounded by the persistent, erect sepals.

Flowers June–July. Hardy.

HABITAT.—Southern Europe from Portugal eastward, Asia Minor, Algeria. Not uncommon in gardens.

The specific name signifies "stem-clasping," and emphasizes the peculiar character of the leaves.

SECTION VIII.—SEMPERVIVOIDES.

Section SEMPERVIVOIDES Boissier, "Flor. Orientalis," 2, 776.

Annual or biennial. Leaves flat, root-leaves forming a rosette. Inflorescence corymbose or racemose-paniculate. Hardy or tender Eurasian plants.

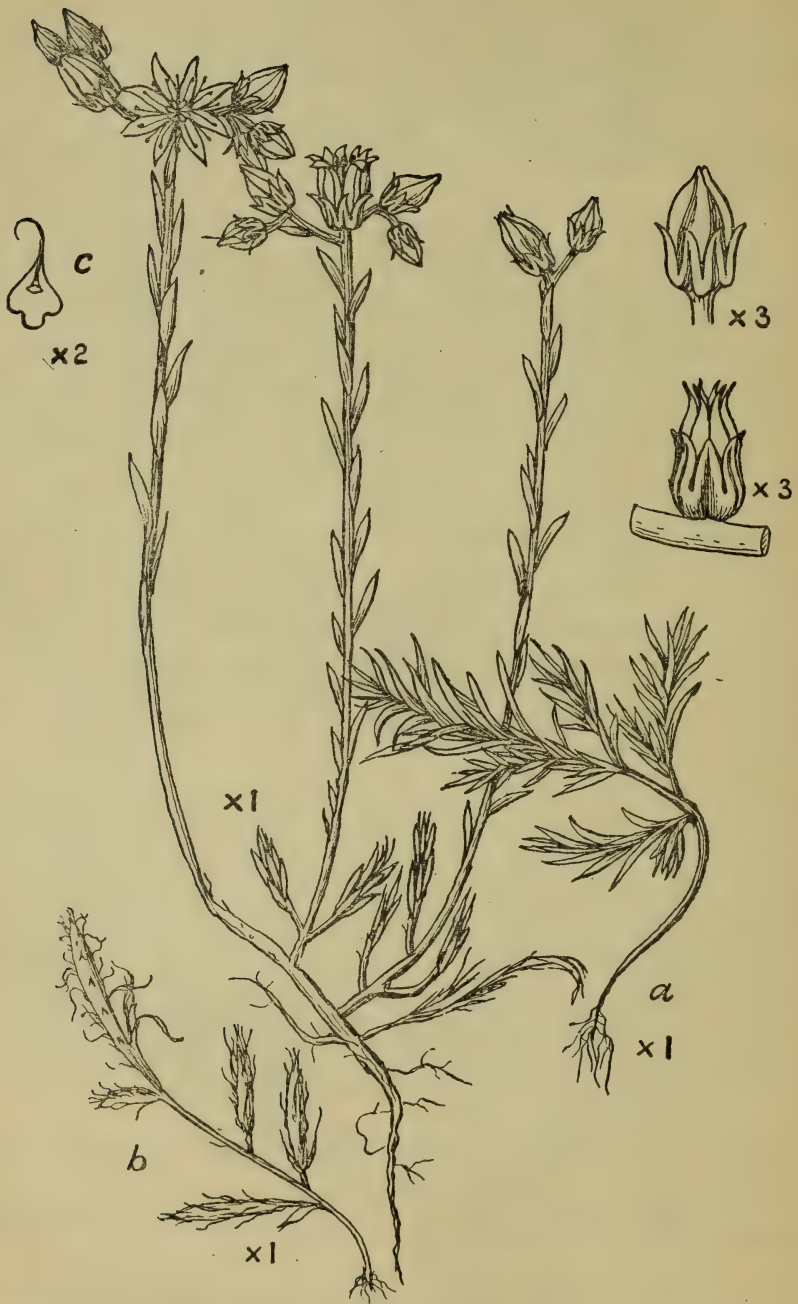


FIG. 163.—*S. amplexicaule* DC.

A rather small group of wide range, its most remarkable members being a few striking biennials from the Caucasus region. The species,

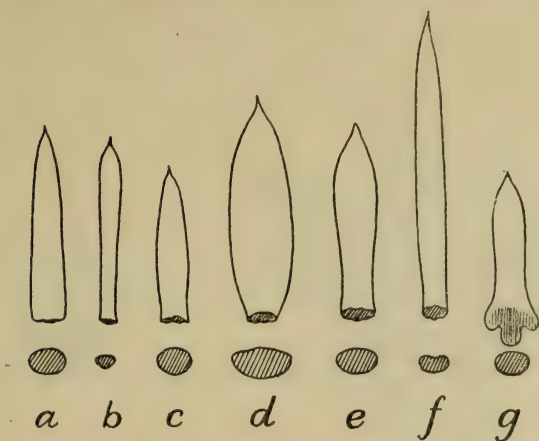


FIG. 164.—Leaves of the *rupestre* group. *a*, *reflexum*; *b*, *rupestre*; *c*, *anopetalum*; *d*, *altissimum*; *e*, *stenopetalum*; *f*, *pruinatum*; *g*, *amplexicaule*. All $\times 2$.

at least those in cultivation, divide themselves into two well-marked sub-groups.

A. *SEMPERVIVOIDES sensu restricto*. Rosettes *Sempervivum*-like, inflorescence dense, leaves sessile, flowers red or reddish:—
sempervivoides Fischer *indicum* Hamet
pilosum M. Bieb.

B. *CEPAEA sensu restricto*. Rosettes lax, inflorescence very lax, leaves stalked, flowers white or yellow.
Cepaea L. *viscosum* Praeger.

While the *Sempervivoides* group is almost confined to the Asia Minor area, the *Cepaea* group is mainly Chinese and includes several well-marked plants in both the white-flowered and the yellow-flowered sections.

A. *SEMPERVIVOIDES* S.S.

137. *Sedum sempervivoides* Fischer (fig. 165).

S. sempervivoides Fischer ex M. von Bieberstein, "Flora Taurico-Caucas.," 3, 313, 1819. Masters in *Gard. Chron.* 1878, ii. 750. Hamet in *Trd. Bot. Sada* (Tiflis), 8, pt. iii. 26.

SYNONYM.—*S. sempervivum* Ledebour ex Sprengel "Systema," 2, 434. Boissier, "Flor. Orient.," 2, 786.

ILLUSTRATIONS.—*Gard. Chron.* 1898, i. fig. 7. *Bot. Mag.* pl. 2174. *Garden*, 19, 354, 1881. Regel, "Gartenflora," tab. 551, 1155. Link "Icones," 1, 57. *Revue Horticole*, sér. 2, 5, 5.

A beautiful and remarkable *Sedum*, allied to the equally remarkable *S. pilosum*, from which it differs in its much laxer leaf-rosette,

broader leaves marked with dark red, scarlet (not rose-coloured) flowers, &c. Like *pilosum*, it is a biennial and comes from the Caucasus. The crimson flowers are unique among cultivated Sedums.

DESCRIPTION.—Biennial, pubescent, with the habit of a *Sempervivum*. First-year stems very short, producing a single leaf-rosette, 1 to 2 inches across

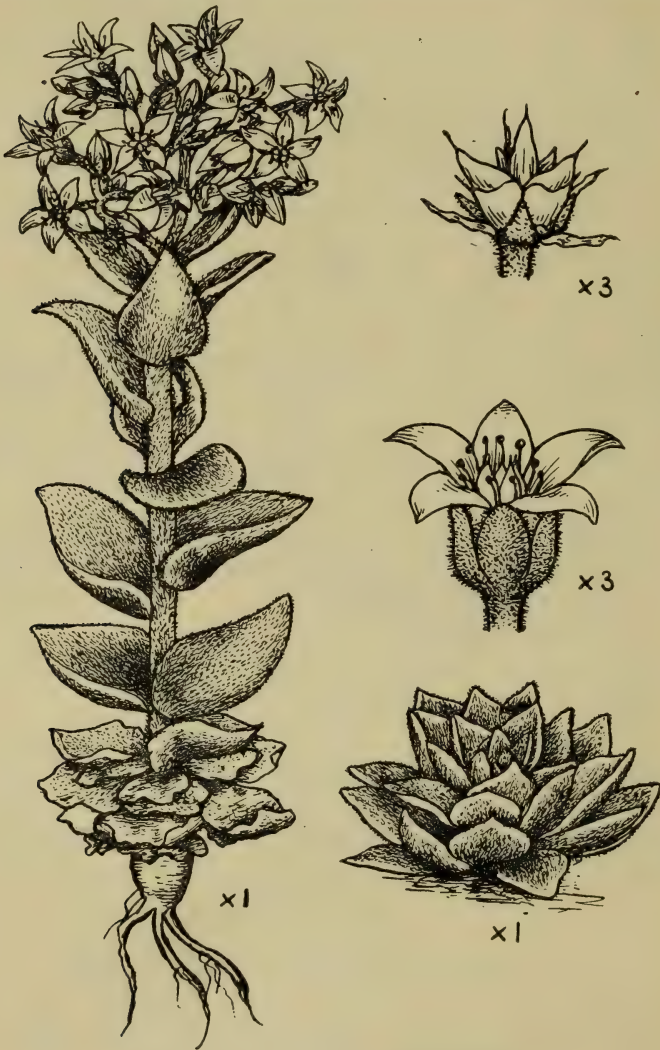


FIG. 165.—*S. sempervivoides* Fischer.

in second year lengthening to 6 to 12 inches and flowering, stout, downy, red, leafy, unbranched save at top. *Leaves* ovate, acute, sessile, very fleshy, purplish, pubescent, ciliate, densely imbricated on the first-year stems, alternate and distant on the flowering stems. *Inflorescence* a large, rather loose, leafy panicle, 2 to 4 inches across, with bracts resembling the leaves. *Flowers* $\frac{1}{4}$ inch long, $\frac{1}{2}$ inch across, 5-parted, pedicels equalling the flowers. *Sepals* erect, red, fleshy, hairy, ovate, acute, separate nearly to the base. *Petals* bright crimson, lanceolate, acute, erect below, curving outwards above, hairy on back, $2\frac{1}{2}$ times the sepals. *Stamens* erect, crimson, nearly twice the sepals. *Scales* small,

reddish, broader than long. *Carpels* crimson, erect, equalling the stamens; spreading in fruit.

Flowers June–July. Hardy.

HABITAT.—Asia Minor and Caucasus. Now found in most good collections.

The specific name emphasizes the plant's resemblance to a *Sempervivum*.

138. *Sedum pilosum* M. B. (fig. 166).

S. pilosum Marschall von Bieberstein, "Flor. Taurico-Caucas." 1, 352, 1808. Boissier, "Flor. Orient.," 2, 786. Hamet in *Trd. Bot. Sada* (Tiflis), 8, pt. iii. 28.

SYNONYM.—*S. Regelii* (a *nomen nudum*) of gardens.

ILLUSTRATIONS.—M. von Bieb., "Cent. Plant." tab. 40. *Bot. Mag.*, pl. 8503. *Gard. Chron.* 1911, i. fig. 160.

A remarkable and showy little biennial plant, with a wealth of rose-pink blossoms. The dense, hairy rosettes of the first year's growth closely resemble those of a *Sempervivum*, but in the second and final year the five-parted flowers with free petals and ten stamens, though in shape recalling those of a *Crassula*, show where its affinities lie.

DESCRIPTION.—Biennial, forming in the first year a dense subglobular rosette of downy, incurved leaves. *Flower-stem* erect, 2 to 4 inches long, leafy, much branched above. *Leaves* of rosette linear-spathulate, bluntly pointed, hairy, sessile, very fleshy, dark green, densely imbricate, about $\frac{1}{2}$ inch long; those of the flowering stems larger, $\frac{3}{4}$ inch long, $\frac{1}{2}$ inch broad, oblong-obovate. *Inflorescence* a dense, much-branched, paniced cyme, $1\frac{1}{2}$ to 3 inches across, surface convex. *Flowers* $\frac{3}{8}$ inch long, $\frac{1}{4}$ to $\frac{3}{8}$ inch across, longer than the pedicels. *Sepals* erect, linear, acute, not contiguous, downy, dark green, separate nearly to the base. *Petals* erect below, wide-spreading above, oblong, acute, rose-coloured, downy on back, $\frac{1}{2}$ longer than the sepals. *Stamens* equalling the sepals, anthers reddish or yellowish. *Scales* minute, oblong, colourless. *Carpels* erect, green, equalling the stamens, styles red. *Fruit* stellate-patent.

Flowers May–June. Hardy.

HABITAT.—Asia Minor, Caucasus.

Though described as long ago as 1808, the plant only recently came into cultivation, and was unknown in our own country until 1910, when seeds were distributed by REGEL and KESSELRING of Petrograd. The species is, unfortunately, only biennial, but the seeds germinate freely. A dry niche suits it well.

The name *pilosum* refers to the hairy nature of the plant.

139. *Sedum indicum* Hamet (figs. 167, 168).

S. indicum var. *genuinum* Hamet in *Notes R. Bot. Gard. Edinb.*, 5, 115, 1912.

SYNONYMS.—*Crassula indica* Decaisne in Jacquemont, "Voyage dans l'Inde," 4 (Botanique), p. 61, tab. 61, fig. 1. Hooker fil. and Thompson in *Journ. Linn. Soc. (Bot.)*, 2, 90. Clarke in Hooker, "Flora Brit. India," 2, 413. *Sedum paniculatum* Wallich Cat., No. 7227.

ILLUSTRATION.—Jacquemont, *loc. cit.*

A very variable plant, inconstant as regards size, hairiness, colour, and the shape of its leaves, and to a less degree all parts of its flowers ; but always recognizable by its biennial duration, *Sempervivum*-like leaf-rosettes, large, panicle inflorescence, and numerous small flowers with five stamens and erect petals having reflexed tips. It comes nearest the *Sempervivoides* group of *Sedum* from the Caucasus

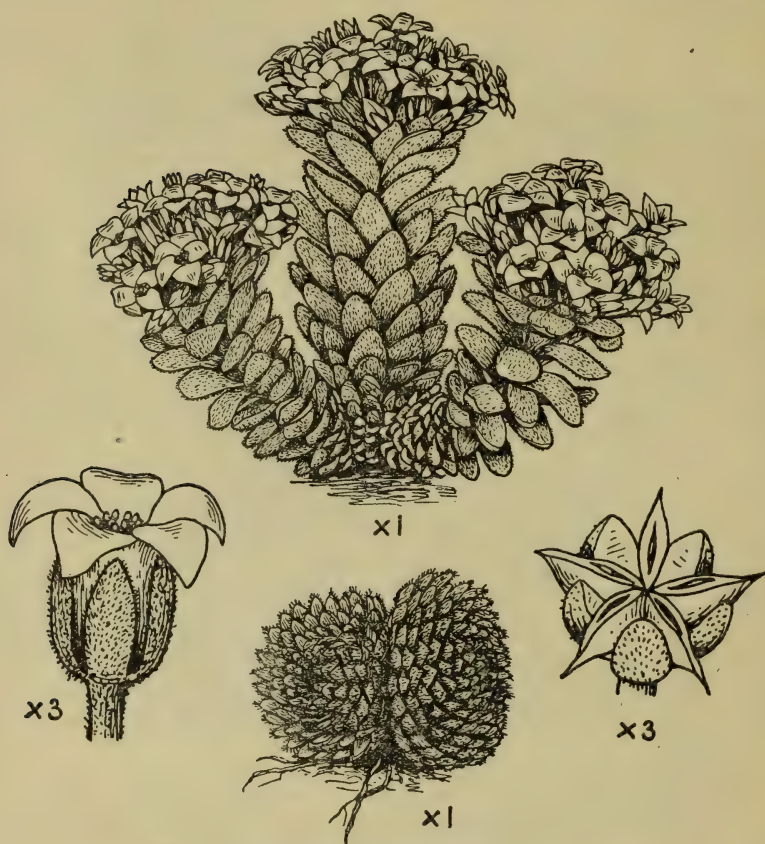


FIG. 166.—*S. pilosum* M. B.

region, and is best placed there, though the flowers are different, especially as regards the number of stamens. I have discussed some of its forms in *Journ. of Bot.*, 57, 55, 1919.

DESCRIPTION.—Biennial, usually glabrous. *Roots* fibrous. *Stem* in first year extremely short, densely leafy, in second year elongate (6 to 12 inches), erect, more or less distantly leafy, round, smooth, usually unbranched below, emitting above alternate, sub-erect or spreading, simple or once or twice forked branches with a few small bracts resembling the leaves, each ultimate branch bearing a simple raceme of flowers without bracts, and lengthening more or less as flowering proceeds. Branches all attaining about the same level, their upper parts smooth or finely papillose. Pedicels $\frac{1}{8}$ to $\frac{1}{4}$ inch long, erecto-patent, rarely patent, often papillose. *Inflorescence* 2 to 4 inches broad, 2 to 4 inches long from the lowest branching. *Leaves* alternate, in first year forming a rather lax rosette about as long as broad, the outer ones patent, the inner erect; very fleshy, $\frac{1}{8}$ to $\frac{3}{16}$ inch thick,

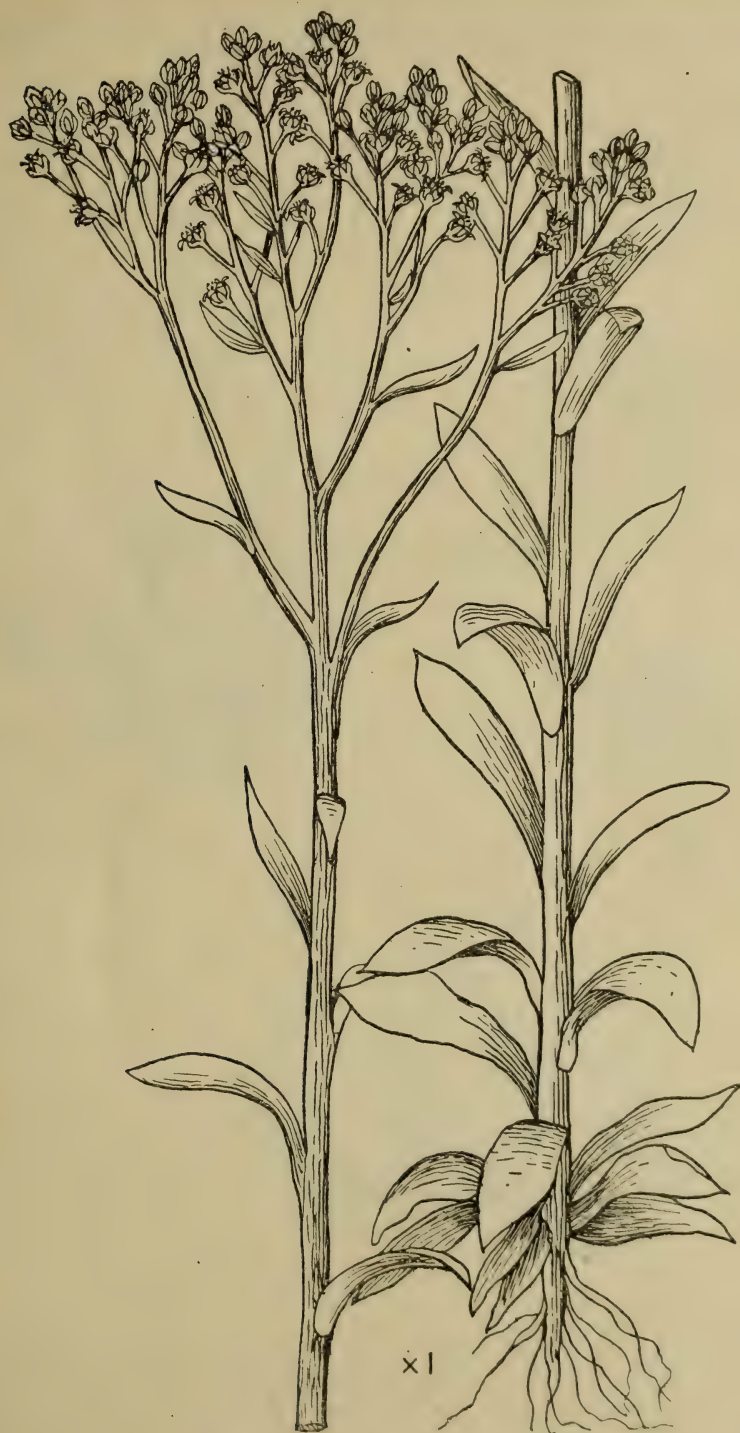


FIG. 167.—*S. indicum* Hamet.

glabrous, rather glaucous, densely red-dotted when old, sessile, spatulate-acuminate to oblong-acuminate, tapered below, broadest $\frac{3}{4}$ way up, ending in a spine $\frac{1}{10}$ inch long, $1\frac{1}{2}$ to $2\frac{1}{2}$ inch long, $\frac{3}{8}$ to $\frac{5}{8}$ inch broad, flat above, convex below;

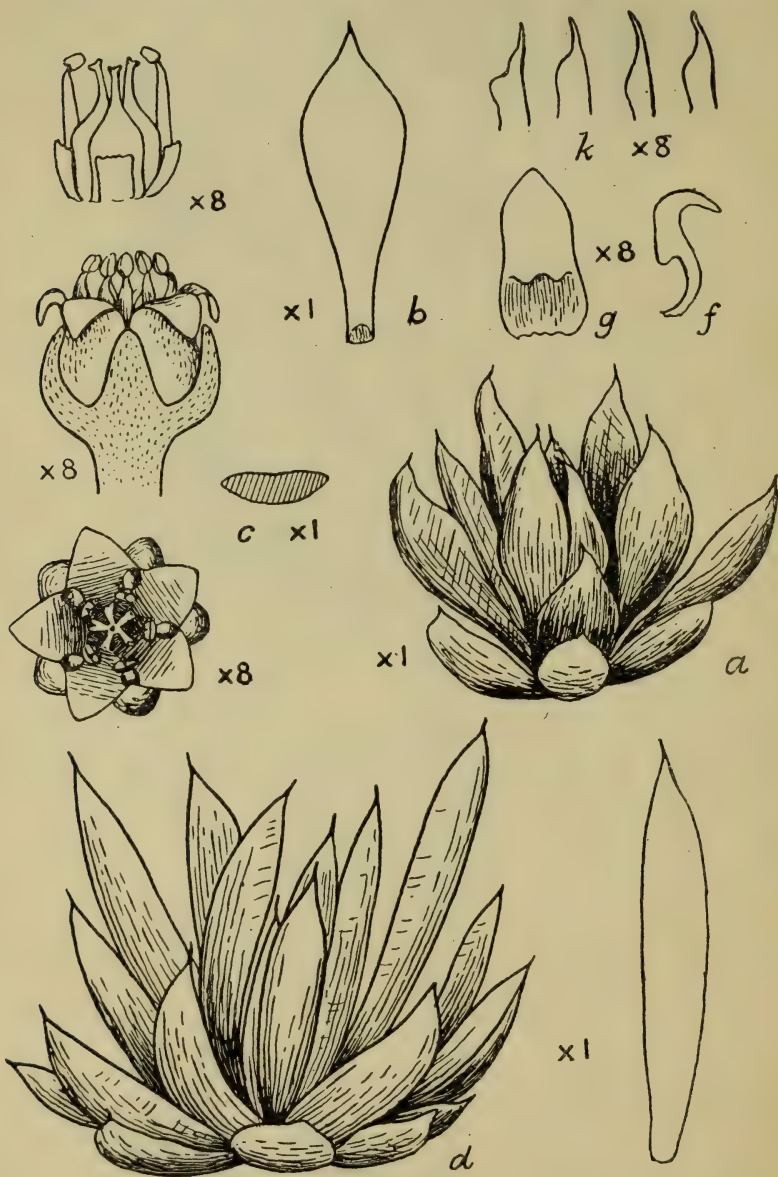


FIG. 168.—*S. indicum* Hamet.

stem-leaves similar or narrower, longer than the internodes, very fleshy, upper bracts linear. Buds ovoid. Flowers roughly globular, $\frac{2}{16}$ to $\frac{3}{16}$ inch long and broad. Calyx in outline hemispherical, $\frac{3}{16}$ inch long, very fleshy, smooth or finely papillose, green dotted with purple, segments 5, triangular to oblong, blunt, much exceeding the tube. Petals erect, $1\frac{1}{2}$ times the sepals, oblong, broadest at base, bluntly pointed, inserted almost horizontally, tips recurved, flat; almost S-shaped in vertical section, concave inwards in cross-section, very fleshy

in upper half, the inner face hollowed out in the lower half (fig. 168, *f*), the lower edge of the thickened portion forming in front view a two-lobed lip (fig. 168, *g*); whitish in the lower part, crimson above, especially on the recurved tip; smooth or finely scabrid on the back, $\frac{1}{8}$ inch long (measured along the curve), $\frac{1}{16}$ inch broad. *Stamens* 5, erect, slightly exserted owing to the petals being recurved, $\frac{1}{8}$ inch long, filaments stout, tapered, contracted and abruptly bent inwards at the apex, white; anthers yellow on face, crimson on back. *Scales* quadrate, curved, emarginate, pink, orange, or whitish. *Carpels* pale green, dotted red in upper part, slightly shorter than the stamens, erect, the inner edge straight or nearly so, the outer edge in its lower half parallel to the inner, or convex, in its upper half contracted, often rather abruptly, into the tapering style (fig. 168, *h*), which is at first erect, later divergent; stigmas capitate.

Flowers September–October. Not hardy.

HABITAT.—Himalayan region, W. China.

The above description is taken from a good series of plants grown at Kew, Glasnevin, and my own garden, from seed sent by Rev. E. E. MAIRE from Tong-tchouan, Yunnan, in 1915. It differs in some minor respects from the descriptions and figures of the plant hitherto published (which were mostly prepared from dried specimens), and in other respects it supplements them. It is clear that we have to deal here with a polymorphic species, and identity of description need not be expected. On fig. 168, *a*, *b*, *c* represent the first-year rosette and one of its leaves, in plan and section, of what may be taken as type; *d*, the rosette and leaf of a narrow-leaved form.

Two varieties have been previously described—var. *Forresti* Hamet with very broad ovate-suborbicular leaves, mostly opposite, and var. *yunnanense* Hamet, a hairy form, of which I am able to amplify the description, as it was well represented among the plants raised from MAIRE's seed.

Another distinct form, deserving of varietal rank, appeared in some numbers among the plants grown from MAIRE's seed, and has been described as var. *densirosulatum*.

Var. *yunnanense* Hamet (fig. 169).

S. indicum var. *yunnanense* Hamet, in *Notes R. Bot. Gard. Edinb.*, 8, 147, 1913. *Crassula yunnanensis* Franchet, in *Journ. de Bot.*, 10, 284, 1896.

Rosettes much smaller than in type, 1 to 1 $\frac{1}{2}$ inch across, lax. *Leaves* not glaucous, green or brown (owing to dense purple mottling on the green surface), with dense, short, white pubescence (especially on the young leaves) over both surfaces, or at least in the upper part and on the edges; hairs linear-deltoid, patent or slightly deflexed; leaves $\frac{1}{2}$ to 1 inch long, $\frac{3}{16}$ to $\frac{1}{8}$ wide, extremely thick (up to nearly $\frac{1}{4}$ inch), oblanceolate, spatulate, acute or acuminate, convex on face, very convex on back, rounded on edges. *Stem* 2 to 4 inches long, hairy, densely leafy, the leaves oblanceolate, pubescent. *Inflorescence* small, (1 inch across), rather dense, flattish, of few branches; branches and pedicels very short, shortly pubescent or papillose; bracts few, obovate-lanceolate, shortly pubescent or papillose. *Flowers* rather larger than in the type, up to $\frac{1}{4}$ inch long. *Calyx* narrower in proportion to its length, papillose. *Petals* papillose on back, oblong-lanceolate (not broadly oblong), devoid of thickening on the face, more erect at base (so that the flower is narrower), and less reflexed at apex, making the whole petal much straighter and the flower longer (fig. 169, *c*). *Papillæ* of bracts, inflorescent branches, sepals, and petals conical. *Stamens* not abruptly bent at apex, anthers red. *Carpels* lanceolate.

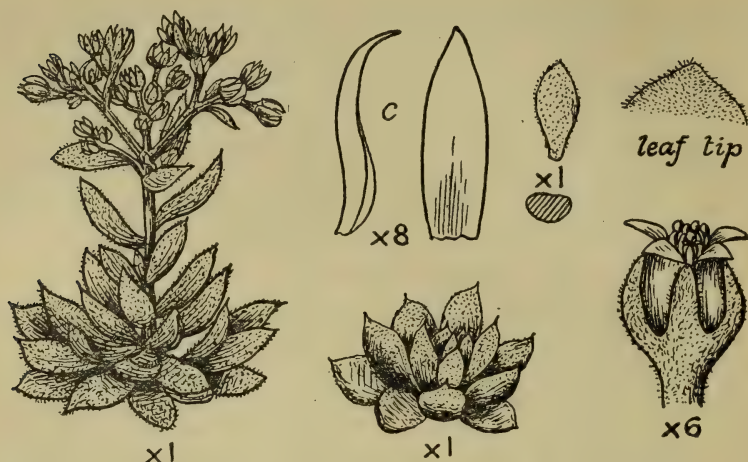


FIG. 169.—*S. indicum* var. *yunnanense* Hamet.

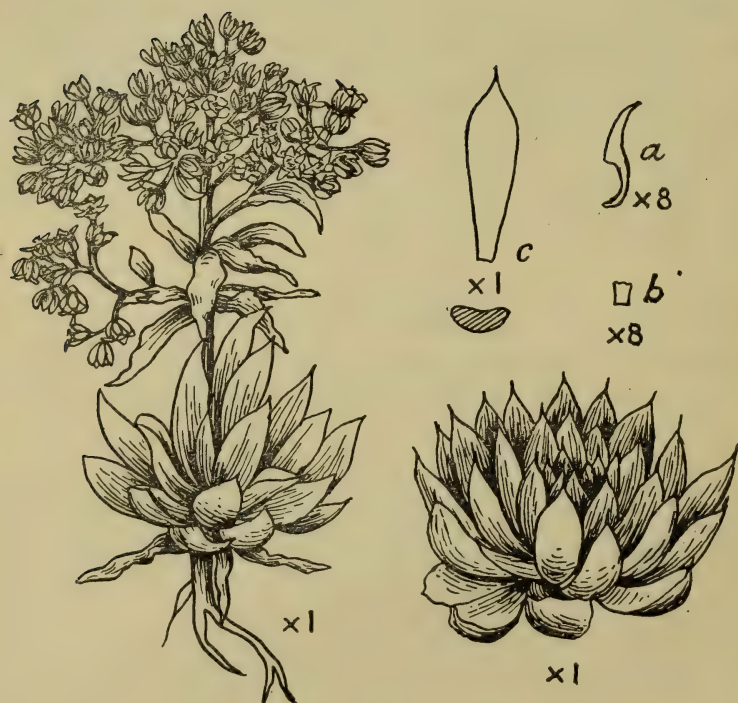


FIG. 170.—*S. indicum* var. *densirosulatum* Praeger.

Var. *densirosulatum* Praeger in *Journ. of Bot.*, 57, 57, 1919 (fig. 170).

Rosettes dense, twice as broad as long. *Leaves* smaller than type (1 by $\frac{5}{16}$ inch by $\frac{1}{8}$ inch), spatulate, acuminate, very glaucous, tipped purple. *Stem* much shorter (2 to 3 inches), branched almost from the base; ultimate racemes short ($\frac{1}{2}$ inch), flowers crowded, on shorter pedicels; whole inflorescence rounded, dense, about 2 inches long and broad. Calyx and corolla more mottled with red. *Petals* straighter, less thickened in upper part, so that the cavity in the lower part is less pronounced (fig. 170, a). *Scales* narrower (fig. 170, b).

B. CEPAEA S.S.

140. *Sedum Cepaea* Linn. (fig. 171).

S. Cepaea Linn., "Species Plantarum," 431, 1753. Masters in *Gard. Chron.* 1878, ii. 750.

SYNONYM.—*S. galioides* Allioni, "Flor. Pedemont.," 2, 120.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 50. Sibthorp, "Flor. Graeca," 5, tab. 448. Waldstein and Kitaibel, "Descr. Plant. Hungar.," tab. 104 (as *S. spathulatum*). Saunders, "Refug. Bot.," tab. 243. *Bot. Register*, 16, 1391. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 10.

A winter annual, appearing in summer or autumn and flowering early the following summer. The tallest of the annual Sedums, growing sometimes a foot in height, and the most branched, its slender pyramidal growth and starlike white flowers separating it from any other cultivated species. Where introduced, it often maintains itself by self-sown seedlings.

DESCRIPTION.—Annual, or occasionally biennial, tall, slender, much-branched, usually hairy; young plants lowly, forming a loose rosette of stalked leaves $\frac{3}{4}$ inch long; petiole $\frac{3}{8}$ inch, flat, nearly linear; lamina $\frac{3}{8}$ inch long, ovate, very blunt. *Stem* a foot or less, erect, hairy, dotted red, with wide-spreading, ascending lateral branches. *Leaves* alternate or opposite, or in whorls of 3 or 4, flat, fleshy, smooth, linear-obovate, sessile, red-spotted; the root-leaves obovate, with a distinct petiole. *Inflorescence* a loose paniced cyme, occupying the whole plant. *Buds* slender, ovate, acute, ribbed. *Flowers* 5-parted, $\frac{3}{8}$ inch across, on long pedicels. *Sepals* green, linear-lanceolate, hairy, separate nearly to the base. *Petals* white, wide-spreading, keeled, lanceolate, with an attenuate acute point, hairy on back, thrice the sepals, nerve red, depressed on face. *Stamens* $\frac{3}{4}$ the petals, spreading, filaments white, anthers purple. *Scales* small, yellowish, quadrate, emarginate. *Carpels* spreading, greenish, tinged red, equalling the stamens; slightly spreading in fruit.

Flowers June–July. Hardy.

HABITAT.—Central and Southern Europe, on shady rocks, &c. Naturalized in Buckinghamshire (Sowerby, "Engl. Bot." ed. 3, 4, 63).

Known in cultivation as early as 1610, but only occasionally found in gardens. I saw it at Leipzig, and with Mr. E. A. BOWLES at Waltham Cross, and received it from Oxford and Wisley. Of late years, *S. stoloniferum*, a very different plant (see p. 196), has been sold under the name of *S. Cepaea* by some nurserymen in England.

Cepaea is a pre-Linnean name for the plant.

141. *Sedum viscosum* Praeger (figs. 172, 173).

S. viscosum Praeger in *Journ. of Bot.*, 57, 57, 1919.

A distinct annual Chinese species, remarkable for the coating of glandular hairs tipped with a very viscid secretion which covers every



FIG. 171.—*S. Cepaea* Linn.



FIG. 172.—*S. viscosum* Praeger.

part of the plant except the stamens and the face of the petals. This character and its flat, entire, rather rhomboid stalked leaves and long-stalked yellow flowers readily distinguish it.

DESCRIPTION.—Annual or biennial, soft, downy, very viscid. *Stem* slender, erect, with many axillary ascending branches, dark red, densely clothed with patent viscid hairs, 4 to 8 inches high. *Leaves* alternate, rosulate in young plants, in flowering plants equalling or longer than the internodes, stalked, soft, fleshy, viscid-hairy on both sides; petiole $\frac{1}{2}$ inch long, lamina obovate trapezoidal, $\frac{1}{2}$ inch long, $\frac{3}{8}$ inch broad, bluntly pointed, mostly tipped with a small purple dot. *Flowers* many, yellow, subopposite the leaves or more rarely axillary, pedicels slender up to $\frac{1}{2}$ inch long. *Buds* ovate, bluntly pointed, viscid-hairy, green or streaked with red. *Sepals* lanceolate, acute, fleshy, green, viscid-hairy, wide-spreading, not spurred. *Petals* linear-lanceolate, acute, $\frac{3}{16}$ inch long, on face smooth, yellow, on back viscid-hairy and greenish dotted with purple, wide-spreading, 2 to 2 $\frac{1}{2}$ times the sepals, erect, and persisting after flowering. *Stamens* 10, yellow, $\frac{3}{4}$ the petals, spreading. *Scales* small, broadly cuneate, minutely emarginate, pale orange-yellow. *Carpels* slender, oblong, greenish yellow, erect,

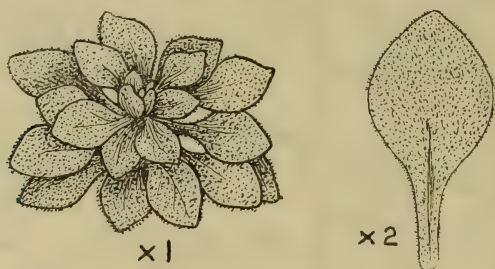


FIG. 173.—*S. viscosum* Praeger.

viscid-hairy, free, save at the very base; styles greenish, glabrous, spreading, about as long as the stamens, nearly erect after flowering.

Flowers June–August. Not hardy.

HABITAT.—Yunnan.

My knowledge of this little plant is due to Rev. Père E. E. MAIRE, who sent me seed in 1915. His label runs:—"Sédum annuel, gluant, rameux étalé-tomenteux, fleurs jaunes. Murs humides, ombragés, de Kin-tchong-chan, altitude 2,990 m." The plant flowered at Kew, Glasnevin, and in my own garden in 1916 and 1917, behaving often as a biennial, but it is, no doubt, normally annual in duration.

It appears to resemble in many respects the northern race of *S. drymarioides* Hance, as described by MAXIMOWICZ (*Bull. Acad. St. Pétersbourg*, 29, 155), but differs in its much larger, flat flowers and other points.

Similar differences separate it from *S. stellariaefolium* Franch. Specimens of *S. viscosum* in the Edinburgh Herbarium have been labelled *S. drymarioides* var. *stellariaefolium* by HAMET, and possibly it may prove best to treat *drymarioides* as an aggregate, with *stellariaefolium*, *Esquirolii*, and *viscosum* as segregates.

Named after its viscid character, which is a very unusual feature in the genus.

SECTION IX.—**EPETEIUM.**

Section EPETEIUM Boissier, "Flor. Orientalis," 2, 776.

Annual, rarely biennial. Inflorescence cymöse, 2- or many-branched, or corymbose. Leaves semiterete or cylindrical (rarely flat), not rosulate. Hardy or tender.

A. PLANIFOLIA *stellatum*, *formosanum*, *Someni*.

B. TERETIFOLIA.

a. Flowers white, red, or blue *hispanicum*, *villosum*, *coeruleum*, *rubens*.

b. Flowers yellow . . *annuum*, *Leblancae*.

There is a considerable number of annual species of *Sedum* which come under the above definition, and they are widely distributed. Very few are in cultivation or worth growing. A few are European, but they are much more abundant in the nearer East and in China, and some are American (chiefly Mexican).

S. rubens, and one or two allies, are usually placed in a separate section, *Procrassula* Schönland (= *Aithales* Webb and Berth.) characterized especially by possessing only five stamens. But the discovery in China in recent years of several *Sedums* (e.g., *S. Scallanii* Diels, *S. Schoenlandi* Hamet, *S. Seelemanni* Hamet, *S. Someni* Hamet, *S. ambiguum* Praeger) possessing, like the *Procrassulas* (which are a European group) only five stamens, but not otherwise related to them, tends to discount the value of *Procrassula* as a natural group. The suppression of the alternate stamens appears to be an abortion occurring irregularly throughout the genus, and not characteristic of any natural group or groups.

A. PLANIFOLIA.

142. *Sedum stellatum* Linn. (fig. 174).

S. stellatum Linn., "Species Plantarum," 431, 1753. Masters in *Gard. Chron.* 1878, ii. 751.

ILLUSTRATIONS.—Sibthorp, "Flora Graeca," tab. 446. Cusin and Anserque, "Herb. Flor. Française, Crassul.," tab. 9. Camerarius, "Icones," 2, 1598.

A small annual of no merit so far as gardens are concerned. Easily recognized among the annual species by its comparatively large spatulate leaves and purplish petals, eventually only half as long as the sepals.

DESCRIPTION.—A glabrous winter annual, appearing in autumn and flowering in June. Stems usually branched below, decumbent at base, ascending or spreading, stout, leafy, 2 to 6 inches long. Leaves alternate, spatulate, cuneate at base, rounded at apex, sometimes with a blunt deflexed point, shortly stalked,

often obscurely and distantly toothed, fleshy, green, shining, up to 1 inch long by $\frac{5}{8}$ broad, smaller above, merging into the bracts. *Inflorescence* generally of two leafy branches with a flower in the fork; bracts similar to the leaves. *Buds* small, ovate, acute, hidden in the large, leafy, nearly erect sepals. *Flowers* purplish,



FIG. 174.—*S. stellatum* Linn.

short-stalked or sessile, pedicels very thick, $\frac{1}{2}$ inch long. *Sepals* large ($\frac{1}{4}$ inch or more long), sub-erect, linear-lanceolate, green, very fleshy, often very unequal, at first slightly shorter than the petals, but often twice as long as them before the petals fade, tube short, thick. *Petals* erect, oblong-lanceolate, $\frac{1}{2}$ to $1\frac{1}{4}$ the sepals, purplish above, white at base, with a strong greenish keel. *Stamens* $\frac{1}{2}$ the petals, erect, filaments white, anthers rose to purple, the epipetalous ones adnate to petals near base. *Scales* small, inconspicuous, whitish, about as broad as long. *Carpels* about equalling the stamens, white, erect, soon spreading widely, stellate-patent in fruit; styles very short.

Flowers early June. Hardy.

HABITAT.—Southern Europe, from S.E. France to Crete.

Rare in cultivation. Has long maintained itself in the gardens of the late Canon ELLACOMBE, and of Mr. E. A. BOWLES. Sent to Wisley by Mr. CORREYON.

A very woody little plant, and the old stems bearing the star-shaped fruits may often be seen standing up among the flowering plants of the following season. The leaves are stated to be sometimes opposite or verticillate.

The specific name has reference to the star-like fruit.

143. *Sedum formosanum* N. E. Brown (fig. 175).

S. formosanum N. E. Brown in *Gard. Chron.* **34**, 134, 1885.

A floriferous annual allied to the Japonica series, which in its spathulate leaves and yellow flowers recalls *S. Alfredi* Hance. It may be distinguished from its allies by its erect carpels, and very large, loose inflorescence.

DESCRIPTION.—A glabrous annual, about 6 to 9 inches high. *Stem* procumbent at base or erect, repeatedly forked di- or trichotomously, round, smooth, succulent, reddish; branches divergent, ultimate branches recurved, indistinctly tetragonal with a groove down two opposite faces. *Leaves* alternate (occasionally opposite), bright green, paler below, softly succulent, recurved, pimplly on face and edges when young, flat, spathulate, entire, very blunt, tapered below but scarcely stalked, midrib depressed on face, 1 inch long by nearly $\frac{1}{2}$ inch wide, smaller above, merging into similar bracts. *Inflorescence* very large, loose, leafy, of many dichotomous or trichotomous branches with flowers in the forks, and a leaf or bract at each fork and below each flower. *Buds* ovate, blunt or apiculate. *Flowers* $\frac{1}{2}$ inch across, sessile or nearly so, bright yellow. *Sepals* spreading, green, unequal, spathulate, shortly-stalked, leaf-like, slightly spurred. *Petals* oblong-lanceolate, mucronate, yellow, $\frac{1}{16}$ inch long, patent, $1\frac{1}{2}$ times the longest sepal, twice the shorter ones. *Stamens* slightly shorter than the petals, spreading, filaments yellow, anthers reddish. *Scales* pale yellow, cuneate, rounded at the apex. *Carpels* greenish yellow, erect, equalling the stamens, styles short, slightly recurved; carpels erect in fruit.

Flowers April–May–June, or September–October (sown in May). Not hardy.

HABITAT.—E. China, Formosa, Korean Archipelago.

Originally described from specimens raised at Kew from Formosa seed in 1885. Grown at Kew, Edinburgh, Glasnevin, and Wisley in 1916 from seed kindly sent me by Mr. W. J. TUTCHER, Superintendent of the Forestry Department, Hong-Kong.

N. E. BROWN describes it as “exceedingly pretty,” but, though very floriferous, the blossoms are rather small and the plant straggling, and, though pleasing, it does not deserve such high praise.

144. *Sedum Someni* Hamet (figs. 176, 177).

S. Someni Hamet in *Journ. of Bot.*, **54**, App. I., p. 18, 1916.

SYNONYM.—*S. Mairei* Praeger in *Journ. of Bot.*, **57**, 53, 1919.

Allied to the Japonica series, but annual or biennial, somewhat resembling, in its rosettes of leaves, the *spathulifolium* group from

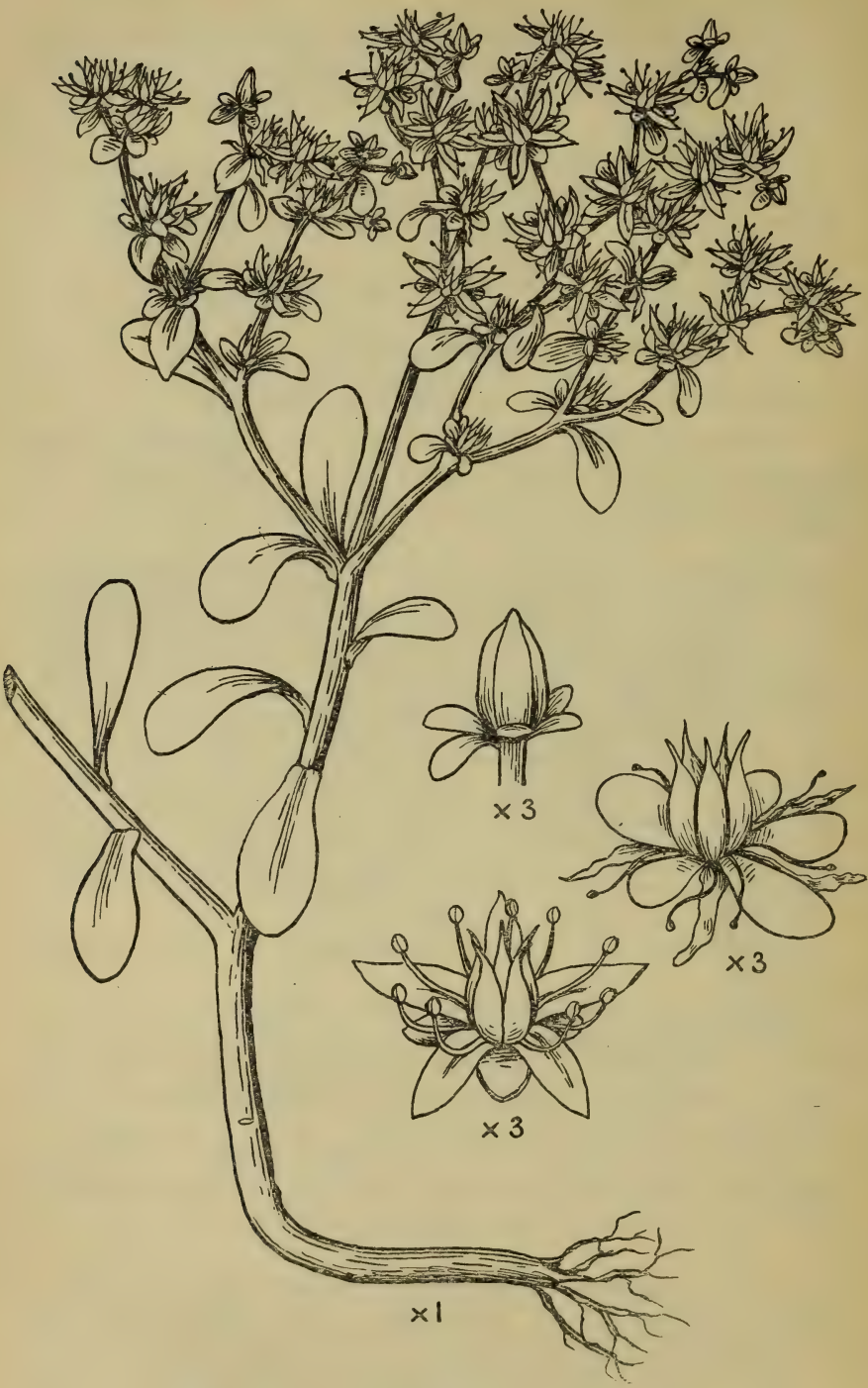


FIG. 175.—*S. formosanum* N. E. Brown.



FIG. 176.—*S. Someni* Hamet.

western North America. Easily distinguished by its usually annual duration, persistent white, membranous, old leaves, tall branched growth, small flowers, beaded upper leaves and sepals, and peculiar scales.

DESCRIPTION.—A loosely tufted, glabrous, sub-deciduous annual or biennial. *Stems* branched, decumbent or ascending, round, smooth, finely striate, shining, dark brownish purple; the barren ones short (2 to 4 inches), with axillary branches above, each bearing a lax rosette of leaves, the fertile ones 6 to 8 inches, leafy, with terminal cymes. *Leaves* of barren stems alternate, entire, sessile, fleshy, flat, oblong-obovate, broad at the base but scarcely clasping, rounded or very bluntly



FIG. 177.—*S. Someni* Hamet.

pointed at the apex, scarcely spurred, 1 by $\frac{1}{2}$ inch, bright green; those of the flowering shoots half as large, obovate, margins beaded, decreasing upwards into similar bracts, the lower ones at flowering time dry, membranous, and white. *Inflorescence* of 3 erecto-patent, forked branches with flowers in the forks, rather flat-topped, 1 to 2 inches across, lowest flower shortly stalked, the rest sessile. *Buds* ovate, bluntly pointed. *Flowers* rather small and inconspicuous, $\frac{5}{16}$ inch across, greenish yellow. *Sepals* unequal, obovate-oblong, obtuse (Hamet) or apiculate, beaded on the edges, shortly spurred, bright green, about equalling the petals, wide-spreading in bud. *Petals* yellow, wide-spreading, ovate, subacute to acuminate, $\frac{3}{16}$ inch long. *Stamens* 5 (sometimes 10), $\frac{2}{3}$ as long as the petals, yellow, the epipetalous ones inserted near the base of the petals. *Scales* small, greenish, narrowly linear in lower half, almost cordate in upper half. *Carpels* green, erect, equalling the stamens, narrowing into short styles, stigmas capitellate.

Flowers July–August (cold frame and gentle heat). Not hardy.

HABITAT.—Yunnan. Grown from seed collected in 1915 by Rev. E. E. MAIRE about Tong-tchouan, 2,900 mètres elevation, and flowered at Glasnevin in 1916 and 1917.

Of the plants raised, one flowered in the first year and then died. In this the flowers had only five stamens, and the inflorescence proved abnormal, being very lax and leafy, with large flowers. The rest flowered in the following season, and the flowers examined had ten stamens. Misled by this, I described the plant as new (as above). Further examination of this material shows that the number of stamens in the flowers is not constant. As the stamens in the type material and in other gatherings in the Edinburgh Herbarium (which like the type are of MAIRE's gathering about Tong-tchouan) are five, it appears that my specimens were exceptional.

Named after Dr. SOMEN.

B. TERETIFOLIA.

145. *Sedum hispanicum* Linn. (fig. 178).

S. hispanicum Linn., "Cent. Plant.," 1, 12, 1755; "Amen. Acad.," 4, 273, 1759.

SYNONYMS.—*S. glaucum* Waldstein and Kitaibel, "Plant. Rar. Hungar." Boissier, "Flor. Orient.," 2, 789. Masters in *Gard. Chron.* 1878, ii. 685. *S. sexfidum*, M. von Bieberstein, "Flor. Taurico-Caucas.," 1, 354.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 51. Sibthorp, "Flora Graeca," 5, tab. 449. Jacquin, "Flor. Austriac. Icones," 5 (appendix), tab. 47. Waldst. and Kit. *loc. cit.* tab. 181. Hallier, "Flor. Deutschland," 26, pl. 2643.

The type is well marked by its annual duration, pinkish-glaucous colour, and pinkish-white flowers with the parts in sixes. The plant, however, is polymorphic, and varies as regards size, duration, hairiness, and the number of the floral parts—see below.

DESCRIPTION.—Generally annual, appearing in autumn or spring and flowering in June; sometimes biennial; two varieties perennial. A small, pinkish-glaucous plant, 2 to 6 inches high. *Stems* branched below, branches ascending, leafy, more or less hairy. *Leaves* sessile, linear to oblong-lanceolate, rather acute, glaucous, often reddish, fleshy, flattened, sometimes subterete, $\frac{1}{2}$ to 1 inch long by $\frac{1}{8}$ inch broad. *Inflorescence* a loose, leafy, flattish cyme. *Buds* ovate, acute, ribbed. *Flowers* $\frac{1}{2}$ inch across, usually 6-merous, sometimes 4-, 5-, or up to 9-merous. *Calyx* short, green, teeth triangular, acute. *Petals* white, very acute, wide-spreading, 4 times the sepals, keeled on back, nerve red. *Stamens* shorter than the petals, filaments white, anthers purple. *Scales* whitish, cuneate, strongly emarginate. *Carpels* erect, often red, smooth or hairy; style long, curving outwards; fruit stellate-patent.

Flowers June. Hardy.

HABITAT.—From Switzerland eastward to Persia.

Carpels sometimes glabrous (var. *leiocarpum* Boissier, "Flor. Orient.," 2, 789), sometimes more or less hairy (var. *eriocarpum* Boissier, *loc. cit.*). If starved, as when grown on a wall, it tends to produce barren shoots and to lose its annual character, thus approaching var. *bithynicum* Boissier, *loc. cit.*

Var. *polypetalum* Boissier, "Flor. Orient.," 2, 789 (fig. 178, a).

Petals 7 to 9, and other floral organs in proportion; sepals lanceolate.

BOISSIER describes the anthers as usually yellowish, and the carpels as glabrous; in my plants, which I received from the Cambridge



FIG. 178.—*S. hispanicum* Linn. and varieties.

Botanic Garden, the anthers are purple and the carpels hairy; but the latter character is so variable in this species that the Cambridge plant may reasonably go under BOISSIER's name. Resembles the type in its size and annual character.

Var. *minus*, var. nov.* (fig. 178, b).

Perennial. Smaller in all its parts, with many crowded barren shoots densely clothed with glaucous leaves $\frac{1}{4}$ inch long, flowering stems about 2 inches high, floral parts in sixes, carpels hairy.

This is the small, glaucous form long used for carpet-bedding under the name of *S. glaucum* or *S. Lydium glaucum*. The latter name, though erroneous, is apt, as out of flower the plant much resembles a glaucous *S. Lydium*. Quite perennial. There is a form of it with yellowish foliage, known in gardens as *S. Lydium aureum*. Though long in cultivation and most distinct, this plant appears to be undescribed. I have no information as to its native habitat.

Regarding the "*S. Wightmannianum*, or *S. Whitmanni* of gardens," of which an incomplete description is given by Masters (*Gard. Chron.* 1878, ii. 751), I have no information; the names do not appear to be found in gardens now. His "*S. Witmanni* of some gardens" (p. 685) refers to *S. hispanicum*; and as in the index to his paper *Witmanni* is corrected to *Whitmanni*, the presumption is that all three names represent that species.

Not infrequent in gardens, mostly as *S. glaucum*. The oldest name, *hispanicum*, is not an appropriate one, as the plant does not occur in Spain, though originally believed to do so.

146. *Sedum villosum* Linn. (fig. 179).

S. villosum Linn., "Species Plantarum," 432, 1753.

ILLUSTRATIONS.—Sowerby, "English Bot." ed. 3, pl. 538. Reichenbach, "Flor. German.," 23, tab. 52. De Candolle, "Plantes Grasses," tab. 70. Hallier, "Flor. Deutschland," 26, pl. 2644. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 16. Zenker, "Flor. Thuringen," 8, tab. 876.

A small downy biennial, with fleshy, linear-oblong leaves and small pink flowers, and stems usually much branched near the base.

DESCRIPTION.—Biennial, downy. *Stem* erect, red, downy, leafy, 2 to 6 inches high, usually emitting ascending branches below, some of which flower. *Leaves* alternate, linear-oblong, blunt, downy, sessile, not spurred, fleshy, flat above, rounded below, $\frac{1}{4}$ to $\frac{1}{2}$ inch long. *Inflorescence* a lax, corymbose cyme with erect branches. *Buds* ovate, blunt. *Flowers* $\frac{1}{4}$ inch across, shorter than the pedicels. *Sepals* very fleshy, lanceolate, blunt, hairy. *Petals* pale purple, ovate, apiculate, twice the sepals, with a hairy back and often a purple keel, concave longitudinally and transversely. *Stamens* shorter than the petals, filaments white, anthers dull purple. *Scales* small, yellowish, emarginate. *Carpels* bright green, oblong, erect, shorter than the stamens; styles short.

Flowers June–July. Hardy.

HABITAT.—From Greenland and Iceland across Europe to Serbia and Algeria. Frequent on damp roadsides in many districts in Scotland and N. England.

A little biennial plant of no horticultural interest, and seldom seen in gardens. It is very exceptional among Sedums in inhabiting

* *Planta perennis, in omnibus partibus quam typo minor; caules steriles plurimi, conferti, foliis glaucis 6 mm. longis dense tecti; caules floriferi 5 cm. alti. Flores 6-meri, carpellis hirsutis.*

damp ground. In the Botanic Garden at Leipzig, it maintains itself in marshy soil on the edge of tanks used for aquatic plants. Sent to Wisley by M. CORREVON, and also seen at Kew. I have had specimens from Ben Lawers in cultivation, by the kindness of Dr. W. G. SMITH.



FIG. 179.—*S. villosum* Linn.

The name is descriptive of its hairy character. According to KERNER, the plant is a partial carnivore, capturing insects by means of its glandular hairs.

147. *Sedum coeruleum* Vahl (fig. 180).

S. coeruleum Vahl, "Symbolae Botan.," 2, 51, 1791. Masters in *Gard. Chron.* 1878, ii. 751.

SYNONYM.—*S. heptapetalum* Poiret.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 2224. *Bot. Register*, 6, 520. Moris, "Flor. Sardoæ," tab. 73, figs. 5-6. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 17.

Quite the most valuable of the annual Sedums. Its mass of small, sky-blue flowers (in which it stands unique) renders it most attractive, and in sun the leaves and stems assume a bright-red colour, providing a striking contrast.

DESCRIPTION.—A small, bushy annual, a few inches high, green or, in exposure, suffused with red. *Stem* round, smooth, finely hairy above, with many lateral branches. *Leaves* alternate, ovoid or oblong, sessile, not spurred, subterete, slightly flattened above, up to $\frac{1}{2}$ to $\frac{3}{4}$ inch long, smaller upward. *Inflorescence* lax, paniculate, occupying the whole plant. *Flowers* 7- to 9-parted, $\frac{1}{4}$ inch across, on



FIG. 180.—*S. coeruleum* Vahl.

long pedicels, deflexed after flowering. *Buds* ovate, blunt. *Calyx* cup-shaped with short, blunt teeth. *Petals* lanceolate, acute, wide-spreading, 3 times the sepals, blue with a white base. *Stamens* wide-spreading, nearly as long as the petals, filaments white, anthers purple. *Scales* small, white. *Carpels* erect, white, turning red in fruit.

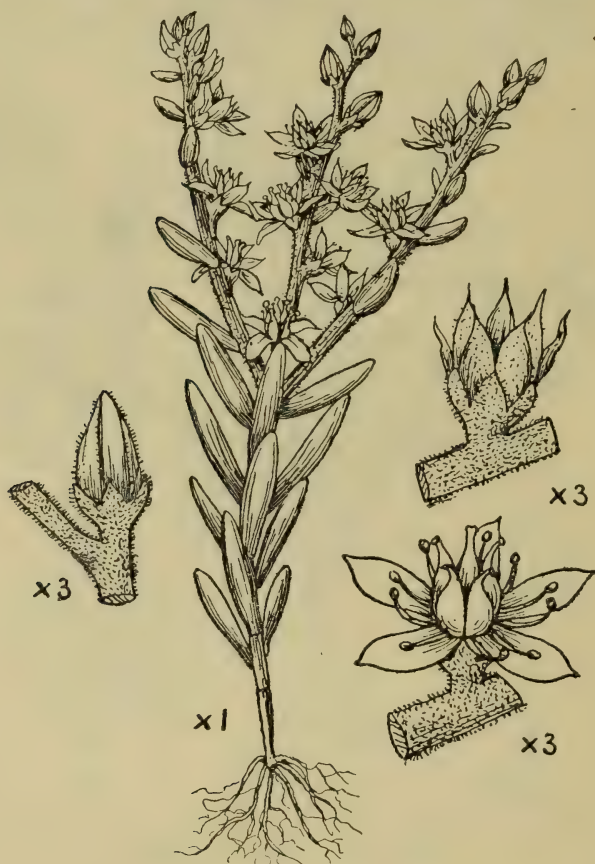
Flowers July–August. Hardy.

HABITAT.—S. Europe and N. Africa from Algeria and Corsica to Malta.

Not infrequent in cultivation. In some gardens it maintains itself freely by self-sown seedlings which appear in early autumn; in others a damp, peaty, or gritty soil is found to suit it best. The specific name refers to the colour of the flowers.

148. *Sedum rubens* Linn. (fig. 181).*S. rubens* Linn., "Species Plantarum," 432, 1753.SYNONYMS.—*Crassula rubens* L. *Procrassula pallidiflora* Jord. and Fourr. *Aithales rubens* Webb and Berth.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 55. "Flora Danica," 1, tab. 82. Sturm, "Deutschlands Flora," 6, tab. 22. Rochel, "Plantae Banatus

FIG. 181.—*S. rubens* Linn.

Rar.," tab. 15. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 11. "Refug. Botan.," tab. 242. Jord. and Fourr., "Icones Plant. Eur.," tab. 80.

A rather dull little annual, a few inches high, with semi-cylindrical leaves and reddish flowers, which differs from most Sedums in having only five stamens. In general appearance it comes near *S. hispanicum*.

DESCRIPTION.—Annual, sometimes biennial, glandular-hairy and sticky. Stem erect, 2 to 4 inches high, simple or branched, hairy above. Leaves oblong-linear, sessile, very fleshy, flat on face, rounded on back, glabrous, blunt, $\frac{3}{4}$ inch long, turning red. Inflorescence of 2 to 4 leafy ascending branches 1 to 2 inches long. Buds ovate-lanceolate, acute, strongly ribbed, hairy, ribs red. Flowers sessile or nearly so, $\frac{1}{2}$ inch across. Sepals green or reddish, hairy, fleshy, triangular, acute, tube short. Petals white or reddish, with a red, depressed nerve,

lanceolate, acuminate, wide-spreading, hairy on the outside, 3 to 4 times the sepals. *Stamens* 5, slightly shorter than the petals, filaments white, anthers red. *Scales* small, white, cuneate. *Carpels* white or reddish, compressed, glandular-hairy or smooth, equalling the stamens, at first erect, wide-spreading in fruit.

Flowers July. Hardy.

HABITAT.—Europe, N. Africa, Canaries.

Rarely seen in cultivation. My specimens came from Wisley, where they were raised from seed supplied by M. CORREVON (as *S. littoreum*).

In the rock-garden at Wisley a curious plant sows itself annually, which has all the characters of *S. rubens* except that the flowers have usually six petals and twelve stamens. In these characters it agrees with *S. hispanicum*; but its stouter, more woody stems, stouter carpels not patent in fruit, and shorter styles, as well as its general appearance, belong to *S. rubens*. It may possibly be hybrid, and its carpels and styles sometimes vary towards *hispanicum*; but on the whole its characters are those of a hexapetalous dodecandrous *S. rubens*.

149. *Sedum annuum* Linn. (fig. 182).

S. annuum Linn. "Species Plant.," 432, 1753.

SYNONYM.—*S. saxatile* De Candolle, "Flore de France," 4, 394.

ILLUSTRATIONS.—De Candolle, "Plant. Succ.," tab. 119. "Flora Danica," tab. 59. Sibthorp, "Flora Graeca," tab. 450. Reichenbach, "Flor. German.," 23, tab. 54. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 54. Mutel, "Flor. Française," tab. 19.

A tiny yellow-flowered annual of no horticultural value, recognizable by its much-branched habit.

DESCRIPTION.—A small, much-branched annual (sometimes biennial). *Stem* smooth, round, greyish, much branched, the branches bifid or trifid half-way up or more, 1 to 3 inches long, with a flower in the forks. *Flowers* many, small, yellow, borne laxly along the branches. *Buds* ovate, blunt. *Leaves* oblong-linear, $\frac{1}{4}$ inch long, alternate, smooth, blunt, sessile, slightly spurred, pale green, in section elliptic, straight or recurved, crowded on the young shoots, distant on flowering shoots. *Sepals* resembling the leaves, oblong-lanceolate, very fleshy, very blunt, unequal, not spurred, fused in the lower half. *Petals* broadly lanceolate or oblanceolate, acute, yellow, twice the sepals. *Stamens* yellow, wide-spreading, $\frac{3}{4}$ the petals. *Scales* oblong, greenish. *Carpels* at first erect, soon spreading, equalling the stamens, greenish yellow, in fruit stellate and surrounded by the persistent, fleshy sepals.

Flowers June–July. Hardy.

HABITAT.—Europe, Asia Minor, Greenland.

Received from Mr. E. A. BOWLES, collected in the Alps in 1914. Seen also at Kew (seed from Lund Botanic Garden, 1916) and at Wisley (seed from CORREVON, 1916).

150. *Sedum Leblancae* Hamet (figs. 183, 184).

S. Leblancae Hamet in Fedde, "Repertorium Sp. Nov.," 8, 311, 1910.

A Chinese biennial (or annual), and one of the few Sedums which possess only five stamens. This, and its linear-spathulate,

4-verticillate leaves, bushy growth, branches densely mammillate above, and yellow flowers with blunt linear sepals as long as the petals, will distinguish it from any other *Sedum*.

DESCRIPTION.—A deciduous, bushy, glabrous biennial, forming in flower a rather dense rounded mass 4 to 6 inches in height and breadth. *Roots* fibrous. *Stem* in first year short (2 to 3 inches), smooth, erect or inclined, simple, or with a few short patent branches, clothed with leaves which fall in autumn; in second year becoming $\frac{1}{4}$ inch thick, with marked constrictions at the nodes, branches often thicker at their apices than at their bases, bearing many slender (1 mm. diameter), erect or ascending, slightly grooved, reddish branches which branch many times and become densely mammillate above, the mammillae forming close, longitudinal rows. *Leaves* variable in arrangement, mostly



FIG. 182.—*S. annuum* Linn.

4-verticillate, sometimes (especially above) ternate, opposite or alternate, narrowly linear-spathulate, blunt, sessile, smooth, fleshy, flat above much rounder below, the lower about $\frac{1}{2}$ inch by $\frac{1}{10}$ inch, diminishing upwards into similar spurred bracts, spur very short, rounded. *Cymes* terminal, very many, each of a central flower surrounded by three short ($\frac{1}{2}$ inch), erecto-patent, leafy dichotomous branches, each bearing a flower in the fork and a few flowers on either side; pedicels shorter than the flowers, the upper ones very short. *Buds* ovate, acute. *Flowers* small, yellow, not opening widely, $\frac{2}{5}$ inch across. *Sepals* resembling the leaves, green, often flushed red, slightly unequal, linear to linear-spathulate, blunt, very fleshy, shortly spurred, up to about $\frac{1}{4}$ inch long, erect or spreading in bud. *Petals* erecto-patent, yellow, equalling the longest sepal, ovate-lanceolate, grooved on face, with a reddish keel on back, nearly $\frac{1}{4}$ inch long, with a short mucro behind and exceeding the blunt tip. *Stamens* 5, episealous, yellow, equalling the carpels. *Scales* small, cuneate, emarginate, greenish-translucent. *Carpels* erect, ovate-oblong, green, $\frac{1}{2}$ the petals, narrowing rather abruptly into the short styles, which are at first erect, later spreading.

Flowers September–October. Not hardy.

HABITAT.—Yunnan. Seed was received from Rev. E. E. MAIRE

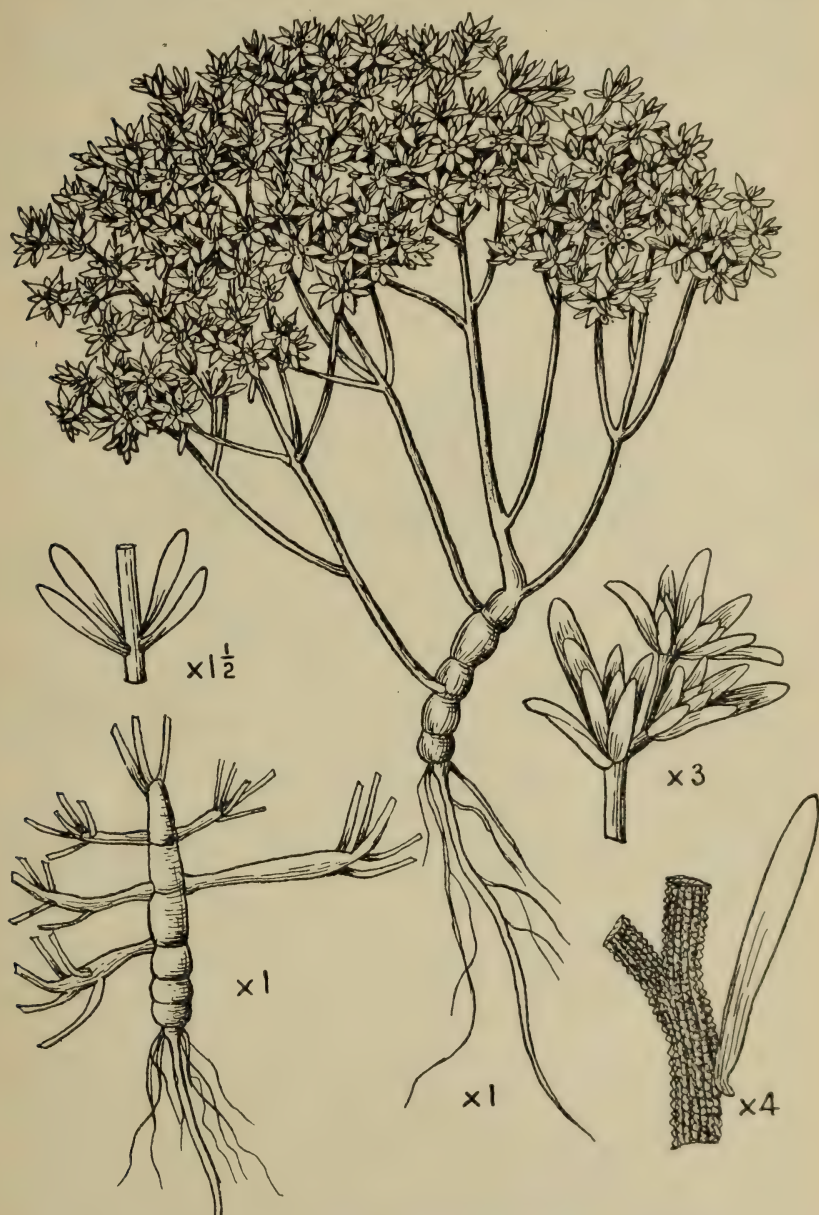


FIG. 183.—*S. Leblancae* Hamet.

in 1915, from Tong-tchouan, labelled "Rochers et murs humides, 2,990 mètres." Flowered at Glasnevin and in my own garden, 1917.

A species of peculiar and characteristic growth-form, unlike any other *Sedum*, so far as descriptions go. Described in 1910 by

HAMET from specimens collected among rocks on the Yo-lin-chan, Yunnan, by DELAVAY (No. 6726), and preserved in the Paris Herbarium. Also collected in Yunnan by DUCLOUX and others. Described as annual; but numerous plants, raised both in heat at Glasnevin and in the open in my own garden, were biennial. The cultivated

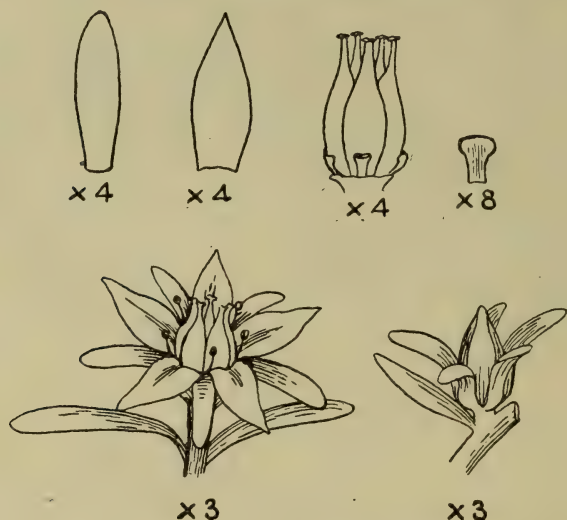


FIG. 184.—*S. Leblancae* Hamet.

plants agreed well with the description, save that they were larger in most of their parts—leaves half again as long and broad, and sepals, petals, and carpels about $\frac{1}{3}$ longer and broader.

Hamet considers it allied to *S. Aliciae* Hamet, *indicum* Hamet (*paniculatum* Wallich), *perpusillum* Hooker fil., *Przewalskii* Maximowicz, and *Schoenlandi* Hamet, and gives the points of difference.

SPECIES INCOMPLETELY KNOWN.

151. ? *Sedum polyrhizum* Praeger, sp. nov. (fig. 185).

At once separated from all other species in cultivation by its curious stems, densely armed with rough scales arranged in rings, and shaggy with short aerial roots almost to the tips. *S. oaxacanum* Rose, which resembles it in habit more than do most of the Mexican species, has its stems somewhat similarly roughened, but to a very much less extent, and *oaxacanum* is a much stouter plant with broader leaves and no aerial roots. The present species much resembles in habit and leaf a small *S. album*.

The plant came from New York Botanic Garden labelled *S. oaxacanum*, and is probably Mexican. Though it grows freely, all efforts to get it to flower have been unsuccessful both at Glasnevin and in my own garden, so that its reference to the genus *Sedum* must

remain for the present unproved. However, I name it tentatively, and describe it so far as the material goes.

DESCRIPTION.—A small, slender, diffuse, evergreen, creeping perennial. *Roots* fibrous. *Stem* procumbent, rooting below, ascending at the tips, slender, $\frac{1}{16}$ inch thick throughout, much branched, bright red above, grey when old, very rough with whitish, asperous, spreading, scale-like projections arranged in crowded rings

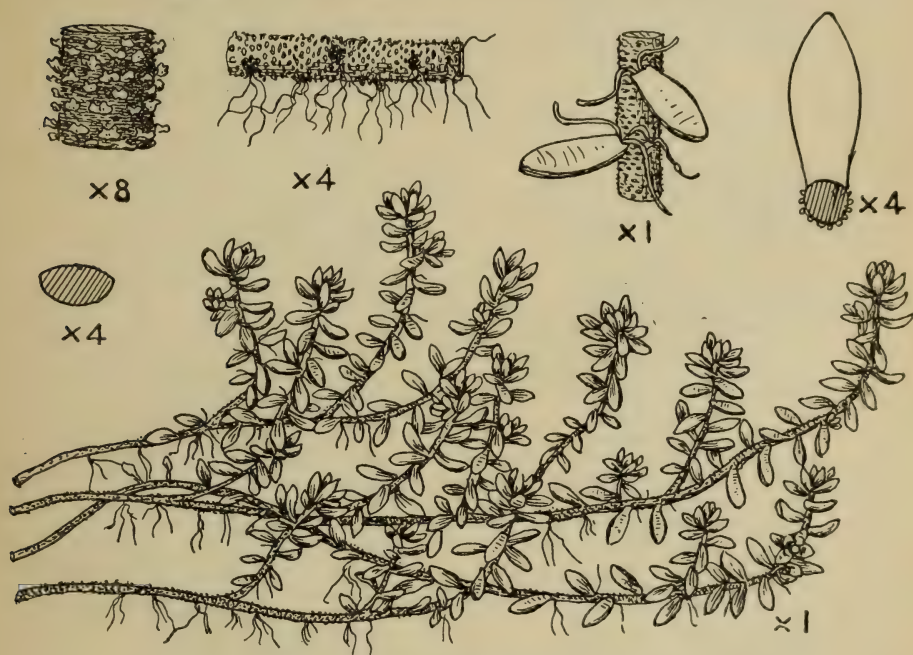


FIG. 185.—? *S. polyrhizum* Praeger.

throughout its length. *Aerial roots* very many, axillary, borne throughout the stem save for about $\frac{1}{2}$ inch at the apex, 5 or less at each axil, $\frac{3}{8}$ inch long, the upper ones alive, bright red, tortuous, the lower ones mostly dead, forming shaggy tufts at the swollen leaf-scars. *Leaves* alternate, crowded, patent or deflexed, longer than the internodes, glabrous, dark green, sessile, oblong-obovate, blunt, flattish on face, much rounded on back, $\frac{1}{2}$ inch long, $\frac{3}{8}$ inch broad, $\frac{1}{16}$ inch thick.

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(In order to render this Index a more complete guide for garden purposes I have included in it the collection of erroneous garden names which I published in *Gardeners' Chronicle*, 3rd Ser., 56, p. 334, 1914. These are distinguished by the reference G.C.)

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MAGNOLIAS.

By P. C. M. VEITCH, V.M.H.

[Read April 27, 1920; Mr. E. A. BOWLES, M.A., V.M.H., in the chair.]

AMONG the many beautiful trees and shrubs grown in the British Isles, Magnolias take a prominent position.

The evergreen *Magnolia grandiflora* has no rival as a wall plant. Its large glossy leaves are attractive all the year round, and its beautiful large white flowers scent the air for weeks together in the early autumn. As a specimen tree for the adornment of the park or pleasure ground—particularly in the milder parts of Great Britain—it is also well worthy of cultivation, but even in the south of England it is safer to treat this plant as a wall plant. There are large trees in Devonshire forty to fifty years old, and 30 feet high, of the Exmouth variety, which are very beautiful, and which lead one to think that more standard trees should be planted if sites can be chosen in good loam and fairly sheltered from cold winds. There have been many failures with Magnolias on walls; but is it not after all the fault of the planter in buying seedling plants which do not bloom so freely as layers from the true Exmouth variety?

M. grandiflora grows to a height of 20 to 30 feet. Its leaves are oval and oblong, the upper surface being shiny and the under surface rusty. The flowers are erect, with nine to twelve petals, white and fragrant. It was introduced from N. Carolina in 1737.

The most distinct of the varieties of *M. grandiflora* is the Exmouth variety, and on account of its flowering early and freely it is the one best deserving of general cultivation. It forms a tall, elegant bush or tree (fig. 186) with oblong, elliptical leaves, generally rusty underneath; the flowers are somewhat contracted, creamy white and very fragrant. One writer on Magnolias had the idea that only those of *M. grandiflora* with a bronze under-surface flowered, but this is not correct. The plants of *M. grandiflora* sold in the nurseries as the common broad-leaved Magnolia are frequently raised from American, French, or Italian seeds, and the plants, though they grow freely, do not flower for twenty or thirty years after being planted out.

M. grandiflora ferruginea is a beautiful foliage plant. The leaves are large, deep green above and a deep brown beneath.

Another evergreen species is also finding favour with plant-lovers, the Chinese species, *M. Delavayi*. Its very large, dull-green leaves, silvery beneath, are very attractive, and though the flowers are not so fine as those of *M. grandiflora*, they are still good. Unfortunately, it is not particularly hardy, and, while growing perfectly on walls, succeeds as a park tree in only a few warm localities. *M. Delavayi* was introduced from China in 1899. From its appearance in sheltered

gardens in the West of England it may be described as one of the finest evergreen trees. Both at Coombe Wood and at Kew it flowered in 1908, but on walls. The flowers, which measure 7 to 8 inches across, are cup-shaped and creamy white. They are peculiarly short-lived, seldom exceeding forty-eight hours, and the scent is so strong as to be considered offensive by many.

Compared with the evergreen the deciduous species and varieties of *Magnolia* are numerous.

In the early days of the cultivation of *Magnolias* many plants of *M. conspicua* and *M. × Soulangiana* were planted on the walls of mansions or houses, and now have heights of 25 to 30 feet and a spread of 20 feet and more, thus hiding many an ugly wall and giving the house a good appearance, especially when the tree is clothed with hundreds of blooms. But the right place for the large-growing forms is undoubtedly the park or garden where they have room to develop, and if in positions sheltered from east winds they are conspicuously beautiful when in bloom. There are many fine trees in the West of England—particularly one in the centre of the City of Exeter, and another in a garden at Plympton, S. Devon, 20 feet high and at least ninety years old—but fine trees are also to be found at Kew and its neighbourhood, and in Hertfordshire. Both are perfectly hardy, but the flowers which often develop as early as February or March are sometimes damaged by frosts or cold winds, but as this does not happen every season the trees are still well worth cultivating.

M. conspicua, the Yulan, is a deciduous tree introduced from China in 1789. It flowers from February to May and attains a height of 20 to 30 feet. There are many forms called by the name "*conspicua*," some having white flowers with narrow petals, while in others they are bell-shaped but with a rose flush at the base. The true form, and certainly the best, has large bell-shaped flowers (very different from the general run of *Magnolias*), and these flowers are pure white without the least tinge of rose (fig. 187). The form with a rose flush at the base is also a beautiful thing and well worthy of cultivation. It might be known in horticulture as *M. conspicua rosea*, to distinguish it from the true white variety.

M. conspicua Brozzoni, with large white flowers slightly tinted a tender violet, is a favourite Continental form.

M. conspicua amabilis is another pure white variety, with small flowers with very narrow petals.

M. conspicua alba superba is a pure white form and well worthy of cultivation; it makes a pretty plant for the garden. Its petals are narrow and the flowers comparatively small.

M. obovata (purpurea) forms a bush of loose habit. It was introduced from Japan in 1790 and grows to a height of 3 to 5 feet. It is a very hardy shrub and grows very successfully near London. The flowers are deep purple outside, often striped with white, and white inside.

The gem of this class is undoubtedly *M. Campbelli*, with glorious

blooms of a deep rosy pink. The tree in the Exeter nursery flowered in 1898 and has produced its blooms regularly, sometimes abundantly but often sparsely, since that date. It is a tall growing, deciduous tree from the Himalayas, often found 150 feet high, introduced into this country in 1868. It flowers in the early spring, from February to April, and the flowers are therefore unfortunately liable to be injured by frosts, but the plant itself is hardy over a wide area. The flowers, which are 6 to 10 inches in diameter, are cup-shaped and of a lovely shade of deep rose outside, pale pink inside; they are sweetly scented.

This species flowered both at Exeter and Cork in March 1903, and blooms were exhibited by Robert Veitch & Son of Exeter, and by W. Gumbleton, Esq., of Cork, at the R.H.S., when a First Class Certificate was awarded. The plant in the Exeter nursery is now 20 feet high with a spread of 20 feet. Another of the same size in garden of C. H. Cave, Esq., at Sidmouth, bore 150 gorgeous flowers in February 1921. *M. Campbelli* is a glorious plant and should be grown in every garden where the blooms can be sheltered from cold winds and frost.

M. × Soulangiana (fig. 188) in all its many forms is a good grower. It is a hybrid which was raised about 1820 between *M. conspicua* and *M. obovata*, gaining from the latter the purplish tinge of its flowers. It makes a very ornamental plant, either for the open garden or trained on the walls of a house. The flowers are white, tinged and flushed with purplish rose. There are some very large specimens to be found in old gardens; one in the Vineyard Garden below Rougemont Castle, Exeter, measures 18 feet by 16 feet, and when this was in full flower on April 20, 1920, it was a sight worth going far to see. There is another fine specimen on an old Georgian house, 30 feet high.

M. Soulangiana Alexandrina forms a good shrub or dwarf tree. The flowers are large and of good shape; the outside petals are shaded white, but the inner row is washed with rose.

M. Soulangiana nigra is a very dark form, giving to the garden a colour that is seldom seen—a deep, bright claret. It blooms in a young state and is quite a useful plant for the open garden. It was introduced from Japan in 1861.

Many other pretty forms of *M. Soulangiana* are grown and are useful either for garden-planting or for forcing for the conservatory, two of the best known being *Norberti* and *speciosa*.

The origin of *M. Lennei* is uncertain. Its character, both as regards size and substance of the leaves as well as of the flowers, and the fact that it flowers later than the ordinary *conspicua* and *obovata* forms, throw doubts on the theory of its being a hybrid of this class. It is undoubtedly one of the most beautiful varieties, and owing to its flowering later than many, *i.e.* in May, it should be grown with success over a large area of the British Isles. The flowers are large, concave, and a beautiful shade of rose-purple outside, white inside.

The variety known as *M. rustica rubra* is a first-class plant; it is hardy, of good habit, and very free flowering. The flowers are large

and somewhat bell-shaped, like those of *M. Lennei*; all the petals are flushed, some considerably, with a bright deep rose. This variety was raised from seed gathered from a plant of *M. Lennei*, but it flowers rather earlier than its parent.

Planters must on no account miss *M. hypoleuca*, a large-growing deciduous tree of erect habit attaining a height of 50 to 80 feet. The leaves are 12 to 18 inches long, pale green with a rosy flush, and this gives the plant a very distinct appearance. The flowers, which are produced in June, are 8 inches across, creamy white in colour, with a mass of bright purplish-red stamens in the centre; they are strongly scented. This is a most striking and beautiful tree, and appears to be hardy generally in England.

M. Kobus has not attracted so much attention as it appears to deserve. In Japan it becomes a magnificent flowering tree 70 to 80 feet high, and it seems very probable that it will attain similar proportions in this country. In the Exeter nursery plants seven to eight years old are already 15 and 16 feet high, with a strong main tree-like stem branched about 5 to 6 feet from the ground. The flowers are like those of *M. stellata*, but with rounder petals; they are about 5 inches in diameter, with six pure white petals, and the seeds are bright red. This species is rather slow to flower at first and only bears a few blossoms in the nursery state, but as it grows into a larger tree it produces its flowers almost as freely as *M. stellata*, and as it is perfectly hardy it is well worth cultivating.

M. salicifolia is a plant of close, compact pyramidal habit; it has small green leaves. It is a deciduous species of slender but strong, upright growth, attaining a height of about 15 to 20 feet. It bears innumerable white flowers, much like those of *M. stellata*, but larger and with longer petals, and these flowers stand out conspicuously on the slender branches. Plants 6 to 7 feet high of pyramidal shape were a sheet of bloom on April 23, 1919. At the Exminster nursery two trees attained a height of 10 to 12 feet in about six years and showed great beauty. The seeds are scarlet and are produced very freely. It was introduced to this country from Japan about 1908, and appears to be quite hardy.

M. Watsoni grows into a stiff tree which is not by any means ungainly; there are trees in the West of England 15 to 20 feet high. It is well worth a good position in the garden, as the leaves are large and pale green. The flowers are borne continuously from May to August and are large and of a beautiful creamy white (fig. 189), with a rosy hue and very strongly scented of allspice. It grows particularly well in a warm light soil, whereas on stronger soil the shoots are apt to die back.

M. tripetala (the Umbrella tree) and *M. acuminata* have been cultivated for many years in this country, and some large specimens are to be found.

M. tripetala is a deciduous tree attaining a height of from 15 to 30 feet, with lanceolate leaves which are often 18 to 20 inches long and

7 to 8 inches broad. The flowers are white with nine to twelve petals, the outer ones being pendent; they are produced from May to July and have a rather unpleasant odour. It was introduced in 1752.

M. acuminata is known as the Cucumber Tree, from the resemblance of its fruit to a small cucumber. It is a deciduous tree of large size, attaining a height of from 60 to 80 feet. The flowers have six to nine petals and are yellowish within, glaucous without; they bloom from May to July and are slightly fragrant. This species was introduced in 1736. There is a fine specimen at Kew.

M. cordata is a deciduous tree with canary-yellow flowers slightly streaked with red, which seldom expand fully. It may be regarded as a form of *acuminata*, but is of dwarfer, more bushy growth. It was introduced into this country in 1800, and there are plants at Kew which flower abundantly.

M. parviflora is a small shrub, but is one of the most beautiful of the family, and it is quite hardy. The flowers which are borne from May to August are white (tinted rose), almost globular in shape, and very strongly scented. The stamens are numerous and of a rosy crimson colour, giving the flowers a very distinct character. "Oxon," writing in *Gardening Illustrated* of July 12, 1919, described a plant of this variety, 10 feet high and 40 feet round the spread of the branches, which flowered very freely.

M. macrophylla has immense leaves, but the true plant is very scarce. A remarkable plant even among the larger Magnolias, its leaves have been measured up to 3 feet in length. Their distinctive character is their sagittate shape, and because of this fact *M. tripetala*, though somewhat resembling it when both are young, should never be mistaken for it. The flowers are creamy white, with a purple spot near the base of each petal, and are very fragrant, flowering in June and July; they are 10 to 12 inches across with six to nine petals. The tree ordinarily attains a height of from 15 to 30 feet, though there is a specimen at Claremont 40 feet high; it succeeds perfectly in a young state at Exminster, S. Devon, but is a rare plant in nurseries. It was introduced from S. Carolina in 1752.

M. glauca (synonyms *M. fragrans*, Swamp Sassafras, Beaver Wood) is a small-leaved species, almost evergreen, with small sweet-scented yellowish-white flowers. It is a native of the United States introduced into this country in 1688. In habit it is a dwarf shrubby tree attaining a height of about 20 feet, almost evergreen. The leaves are elliptical, deep green above and glaucous beneath. The flowers are produced from June to September.

M. glauca Thompsoniana was discovered about 1808 amongst a pot of seedlings of *M. glauca*, and was propagated by Mr. Thompson in his nursery at Mile End, under the above name. It is a loose-growing shrub with creamy white flowers, which are larger than those of *M. glauca*, and is probably a hybrid between *M. glauca* and *M. tripetala*. The plants flower in a small state.

M. Fraseri (synonym *M. auriculata*), a deciduous tree of spreading habit, was introduced into this country from the South-Eastern United States. It has distinct foliage and makes a handsome tree, attaining a height of from 30 to 40 feet. The flowers, which are produced in May and June, are about 8 inches across with nine petals, pale yellow at first and afterwards milky white.

M. stellata has been grown since 1878 and has proved to be quite hardy. It is one of the most beautiful of early-flowering shrubs and should find a place in every garden. It blooms more profusely than any other Magnolia, even small bushes being covered with fragrant blossoms in March and April. The numerous small twisted pure white petals give a semi-double appearance to the flower. It is compact in growth, plants several years old being 5 feet high by 4 feet through. It is a useful plant for a wall facing south and west, where it flowers early in April, sometimes in March; it is also very successful as a bush, but should be planted where sheltered from cold winds. It is a good subject for conservatory decoration, as also are *M. parviflora*, *M. conspicua*, and *M. Soulangeana* and its many forms. The variety *rosea*, a pretty form of *M. stellata*, received an A.M. in 1893, when it was exhibited under the name of *M. stellata*, pink variety. It is now very rare.

M. officinalis was introduced from China. The leaves are very large, some young trees in Cornwall having already produced leaves 21 inches long and of great width and thickness. It is not yet in commerce.

M. Wilsonii, still very scarce, forms a shrub or small tree. The flowers in shape and size resemble those of *M. parviflora*. It is, however, distinct. Mr. Wilson, who found it in China, says: "In late May and early June it is very conspicuous with its pure white sepals and petals and bright red stamens and carpels." It flowered freely in Cornwall in 1920.

M. denudata var. *purpurascens*.—There are several forms of *M. denudata* and the one which has flowered in Cornwall appears to be this variety. It is Wilson's No. 688 of his first Veitchian Expedition. It promises to be a shapely tree; the flowers come early and are very beautiful, being near *M. Campbelli* in colour, but not nearly so large, and not offering such a large target for wind. It is not yet in commerce.

M. pyramidata was discovered in Georgia. In some ways it is like *M. Fraseri*, but is to all appearances not hardy. It is not now in commerce.

M. Sargentiana.—Wilson in his "Plantae Wilsonianae" says: "This remarkably distinct species is perhaps most closely related to *M. Campbelli*. It grows to a greater size than any other Chinese Magnolia, and is one of the noblest of the family." It is not yet generally in commerce.

M. fuscata has dull purple flowers, small and very fragrant. It flowers in April. It is a good greenhouse shrub, though in the West of England large plants may be found on outdoor walls.



FIG. 186.—*MAGNOLIA GRANDIFLORA*, EXMOUTH VARIETY.

[To face p. 320.



FIG. 189.—MAGNOLIA WATSONI.

[To face p. 321.

M. Soulangeana, *rustica*, and *Thompsoniana*, appear to be natural hybrids, but I have been so fortunate as to obtain a direct hybrid. It was in 1907 that pollen was obtained from *M. Campbelli*, growing out of doors, and applied to *M. conspicua*, forced into bloom, the result being the saving of seven ripe seeds. These were duly sown and I had five young plants. These grew vigorously, and in spite of transplanting soon attained a height of 12 to 14 feet. The first flowers appeared in 1917 and since then they have flowered annually. Four of the plants bore creamy white flowers, 5 to 6 inches long, and sweet scented. The foliage in some resembles that of *M. Campbelli*, and in others is intermediate.

Fortunately one plant is quite distinct in colouring, being intermediate between its parents. Mr. W. J. BEAN, our great authority on hardy shrubs and trees, saw some of its flowers in Exeter in 1919, and has favoured me with a description for publication. This year (1920) twenty buds appeared, but owing to mild weather developed in February and were badly damaged by ten degrees of frost. The following is Mr. BEAN's description of the plant :

"*Magnolia Veitchii*.—In April 1919, during a visit to the Royal Nurseries at Exeter, Mr. P. C. M. Veitch showed me a bloom of his new hybrid Magnolia for which I propose the above name. He raised it in 1907 by crossing the Yulan (*M. conspicua*) with *M. Campbelli*, and a very remarkable tree is the result, as beautiful in flower as it is noble in foliage. It may be described as follows :

"A deciduous tree which will no doubt grow ultimately to a height of 30 to 40 feet ; young wood purplish, clothed at first with appressed grey hairs, becoming brown the second year. Leaves obovate, mostly rounded at the base and terminated by a short abrupt point ; they vary considerably in size, the largest being 10 inches to 12 inches long and 5 inches to 6 inches wide, the smallest with about half those dimensions ; dark green at maturity but purplish (especially beneath) when young ; the mid-rib and chief nerves clothed with grey down ; leaf stalk $\frac{3}{4}$ inch to 1 inch long and downy. Flowers solitary at the end of the naked twigs, each measuring 6 inches long ; petals nine, $1\frac{1}{2}$ inches to 2 inches wide, rounded and broadest near the apex, tapering towards the base. The colour is a lovely blush pink.

"From this description it will be seen that this hybrid is intermediate in several respects between the parents. In size of leaf it has inherited the fine dimensions of *M. Campbelli* and a good deal of its pubescent character, but in shape and firmness of texture it favours the Yulan more closely. The entire flower and the individual petals are intermediate between those of the parents in size, and the pure whiteness of the Yulan has diluted the colour derived from *M. Campbelli*. Like so many hybrids, *M. Veitchii* possesses great constitutional vigour. The raiser is to be congratulated on obtaining a fine addition to a group of flowering trees and shrubs. It ought to be perfectly hardy over the Southern half of England, and in all the Western counties."

Magnolias may be propagated by layers, from seed, or by grafting. The first is naturally very satisfactory, but it is a slow process ; seeds can be depended upon with *parviflora*, *salicifolia*, and some other true species ; grafting is very general, as stock may be obtained quickly in large quantities. At one time *M. purpurea* was used as a stock, but on it the plants became stunted in growth. On *M. acuminata* as a stock they are very satisfactory, as no suckers appear so far as my experience goes, and they succeed in almost any good deep soil.

At our Exminster nurseries all the Magnolias succeed perfectly. The soil is naturally light, but there is a good depth, and with an admixture of peat the plants lift with good balls. At our Exeter nurseries, where the soil is heavy loam, most varieties succeed if a little peat be added, though *M. Watsoni* is apt to die back.

There have been many views expressed as to the best time to transplant Magnolias. I would not be dogmatic, but I have despatched plants from early autumn to spring with great success even with large bushes and standards 8 feet, 10 feet, and up to 15 feet high. Of course, owing to regular transplanting, they have been lifted with large balls. I am more afraid to despatch long distances in late spring than at any other time. If still quite dormant or even with advanced flower-buds they may succeed, but I think not when the leaf-buds have begun to develop.

M. grandiflora and other evergreen species should be grown in pots, and may be transplanted from them during many months of the year. It must, however, be remembered that these have large fleshy roots and need considerable attention after transplanting. One thing that many fail to do is to press the new soil firmly round the ball and give a good soaking of water. It should be remembered, too, that positions on walls are always drier than the open garden, and consequently watering and some syringing are necessary during the first year and perhaps also during dry spring and summer weather. Mulching with leaf-mould would save much watering, but not altogether on walls facing due south or under overhanging eaves.

GARDEN ROSES.

By H. R. DARLINGTON, F.R.H.S.¹

[Read June 29, 1920; Mr. W. A. BILNEY, J.P., in the Chair.]

Of late years so much has been written and spoken on Garden Roses that it may seem superfluous to add to it and difficult or impracticable to find any new thing to discuss.

But the Rose world of our gardens is constantly changing. The constant yearly inflow of new varieties, so far as America and Great Britain were concerned, was but slightly lessened even by the war, and the reports from Bagatelle show that the French growers are again to the front. These new varieties at times give us new plants which prove in some way better than those previously in use. Thus our Roses are constantly changing, partly as the result of improvement on existing types, and partly through changes of taste, such as the shifting of the popularity, which at one time centred in the exhibition Rose, to the decorative Roses, which have been found to be more useful for adorning the garden and to provide a larger number of flowers for gathering and use in vases or bowls for the dinner-table and sitting-rooms.

Garden Roses consist of two great groups. First, the dwarf varieties which we grow in beds and borders, and secondly, climbing roses for covering arches, pergolas, and other structures.

There is an intermediate group available for hedges or use as isolated bushes or in large shrubby-like beds; but for the moment we may disregard these.

Each of our two great groups may be again divided into two sub-groups, according as they bear large more or less solitary flowers, or carry their flowers in bunches or clusters. In the dwarf group the large-flowered varieties are most numerous and important, while among the climbers the chief place is taken by the bunch-flowered section.

These divisions are purely arbitrary and have no pretence of resting on any botanical or scientific characters, but are merely adopted for convenience of treatment; and even so, roses of intermediate character will be found between each group, which will be treated solely as convenience dictates, and without regard to their natural affinities or derivation.

Turning first to large-flowered dwarf varieties suitable for beds and borders, let us take a really popular Rose and consider the qualities that have given it its place in general esteem. Perhaps no Rose has

been and still is more popular of its type than 'Mme. Abel Chatenay,' and it will serve my purpose.

1. The flower is of shapely form.
2. It is carried well on the stalk, not too stiffly, and yet it does not hang its head.
3. The colour of the petals is bright, distinct, and pleasing.
4. The flowers are produced continuously during the season.
5. The substance of the petals is firm and good, so that the flowers are not destroyed by the first shower of rain and will stand travelling.
6. The flower is fragrant.
7. The plant grows well at least when young, and has a branching habit, so that it will make a good bush.

I think this concludes its good qualities. Now for some bad ones.

8. The habit of the plant is not all that can be desired ; it is too apt to push a single strong shoot for its second growth, making the plant lop-sided.
9. The foliage is rather sparse and somewhat easily attacked by mildew and readily by black-spot.
10. Though individuals vary greatly, many plants are not long-lived.

1. The question of form is worth a little consideration. In the great variety of the form of flower in the Rose, we may find more than one possessing attributes of beauty, and perhaps we ought not to be too exclusive in our appreciation, or pedantic in defining types. Thus among exhibition Roses we may find forms of great beauty in 'Avoca,' 'Mme. Mélanie Soupert,' 'Horace Vernet,' 'Mrs. Theodore Roosevelt,' 'Maman Cochet,' pink and white 'Bridesmaid,' 'Mrs. Foley Hobbs,' and 'Mrs. J. H. Welsh,' all representing slightly different modern forms, and 'Marie Beauman,' 'Mrs. John Laing,' and 'A. K. Williams' representing older forms less often seen to-day.

There can be little doubt that the disfavour into which the exhibition Rose has fallen is due, at least in part, to the admission of really ugly types, such, for instance, as those resembling a potato surrounded by a collar, which, if large enough, were accorded equal recognition with the more beautiful forms. These ugly forms, however, soon disappear in the hands of amateurs whose principal object is garden beauty, and whose views are not solely confined to the exhibition box, and we need not delay further with them.

The course of development of nearly every new type of Rose that has been introduced has been so uniform in character that I think public taste may be considered as having accepted one type of form as the ideal, towards which improvement in this direction gradually approximates. This is the form with high-pointed centre and well-arranged reflexed petals.

The form of the opening bud in single Roses, whether of the wild

Dog-rose or still more in the longer-petalled forms, such as 'Irish Elegance,' cultivated in our gardens, is of great beauty, but lasts at most for a few hours. In the case of the Dog-rose the petals close the first night and never again.

As the single Rose has become doubled in cultivation, the early double forms all seem to show short centre petals, giving the flower a flat, or even saucer-shaped, appearance. The raising of the centre petals comes much later, as the result of further cultivation, hybridizing, and selection.

The process may be traced through the illustrations in the old gardening books, Parkinson, Gerard, Redouté, Curtis, and others, and it will be found that the high-centred form is a development that has come comparatively recently in the history of the Rose.

An interesting example of this process in a modern Rose, now in course of development, is to be found in the group raised by M. Pernet Ducher, variously known as Austrian hybrids, Hybrid Luteas, or after the name of the raiser.

In order to get the golden colour he desired, M. Pernet Ducher had to go back to the old Persian yellow, the origin of which is unknown, but it is clearly of great antiquity, and was brought from the East about 1833 by Mr. Henry Willock. It is a comparatively small flower, double, with a flat centre of a rather primitive type, and M. Pernet Ducher proceeded to cross it with the Hybrid Teas, repeating this process with the selected offspring, a process that has been continued by himself and others.

The first result of the cross was 'Soleil d'Or,' brought out in 1900. It proved to possess a fine colour, fair size, and good strong growth, but the form of the flower was flat-centred with rounded incurved petals, giving it rather a heavy appearance.

One of the first Roses connected with this group in which the higher centre began to appear was 'Mrs. A. R. Waddell' (1908), a plant which, though retaining the large thorns and something of the colour of the new type, was in some respects nearer to the Hybrid Teas. 'Arthur R. Goodwin' (1910) has a nicely pointed bud, but the open flower has a flat centre with short inner petals, and retains therefore the primitive type. Much the same may be said of 'Rayon d'Or' of the same year, which attracts chiefly by its colour and glossy foliage. 'Constance' (1915), not quite so good in colour, was slightly better in form, while we find a great advance in 'Mme. E. Herriot' (1913).

Every year fresh Roses of this type are appearing such as 'Mrs. Wemyss Quin' (1914), 'Christine' (1918), 'Mme. E. Herriot,' and 'Independence Day' (1919), in which a gradual improvement in form, by the raising of the centre and regular arrangement of the surrounding petals, may be recognized, though the flat centre may be traced in many of the forms of this group still being brought out.

A similar process, though less well marked, may be traced in the Rambler (*multiflora*) section, which first came into notice on the

introduction of 'Crimson Rambler' by Mr. Turner in 1893, and the Wichuraiana group headed by 'Dorothy Perkins,' 1901.

The highest development of this form is, I think, to be found in the Tea Section, which have been rightly named the aristocrats of the race. For instances, I may take 'Mrs. Herbert Stevens' of the looser type of flower, and 'Maman Cochet' and the 'Bride' (the latter now chiefly grown under glass) of the full-flowered type.

To my fancy, the form of the high-centred flower somewhat resembles in outline that of the opening bud of the single Rose, but it will retain its beauty of form in favourable circumstances for two or three days in place of as many hours as go to the life of the bud form of the single Rose.

If this be so, we find the greatest beauty of form at the two ends, or perhaps the beginning and end, of the scale of evolution. In few, if any, Roses are the petals even approximately flat. They are in nearly all cases more or less rounded or boat-shaped. Consequently in the open flower the petals are either incurved and concentrically arranged, or the petals bend outwards instead of inwards, the upper edges, particularly in the outer petals, are rolled backwards by the growth from below, and we get the reflexed type of flower. The reflexed type being generally preferred, a custom has arisen amongst many exhibitors of manipulating flowers of the incurved type so as to make the petals bend outwards instead of inwards as they would naturally do, and the flower as shown ceases to represent the true form of the variety as we see it growing on the plant in the garden.

A little assistance to enable the flower to open and in the removal of stained or injured petals is legitimate enough, but in the interests of the public who are likely to purchase plants from seeing them at our shows, it is desirable that the rule against over-dressing so as to alter the character of the flowers should be strictly enforced.

I may refer to one more point on the question of form. Some Roses seem nearly always to produce well-formed flowers throughout the season, others may do so only at the summer-flowering, while others, again, will do so only under the highest conditions of cultivation, or will produce a large quantity of flowers, only some of which are pleasing.

A Rose that will produce well-shaped flowers uniformly throughout the season possesses great advantages for garden purposes over one that will only do so occasionally, and several of the decorative Hybrid Teas and Teas possess this quality. We find it in 'Mrs. Herbert Stevens,' 'Alexander Hill Gray,' 'Mme. Henri Berger,' 'Mme. Abel Chatenay,' 'Mrs. E. G. Hill,' 'Mrs. Wemyss Quin,' and 'Mme. Léon Pain,' in a greater or lesser degree; also in the summer-flowering Hybrid Tea, 'Paul's Lemon Pillar,' while 'Richmond,' 'Prince de Bulgarie,' 'Joseph Hill,' and 'General McArthur' usually give us well-shaped flowers in early summer and again in autumn, the second flowering in late summer flowers being less satisfactory in this respect.

In the days of the old Hybrid Perpetuals, in order to secure a few well-shaped flowers of any one variety, it was usually necessary to grow a good many plants, and pay strict attention to cultivation and careful and timely disbudding. Even 'Victor Hugo,' one of the freest and best, suffers from this defect. 'Frau Karl Druschki' is the nearest approach to an exception in the group, the flowers being usually good even if not disbudded.

The popular and beautiful 'Lady Hillingdon' seems to me to depend much on the soil and situation in which it is growing. In my own gravelly garden a large number of the flowers produced, especially in late summer, are of rather poor form and quality, while in more generous soils the proportion of well-shaped flowers seems to be much larger.

In the dwarf Polyanthas, two of the earliest of the section 'Cecile Brunner,' 1880, and 'Perle d'Or' (1883) had beautifully formed little flowers. Later, colour seems to have monopolized the group to the detriment of form, which is only beginning to reappear in such Roses as 'Little Meg,' while in the climbing section, except in the singles, there is little to note but 'Emily Gray.' 'Christine Wright,' and occasionally 'Léontine Gervais,' may remind us that it may not be impossible to find beauty of form even here.

2. The carriage of the flower on the stalk is of great importance in considering the decorative value of a Rose in the garden. On the one hand, a flower that is carried bolt upright on a short stiff stalk, as we find in 'Florence Forrester' and 'Mrs. George Norwood,' is too stiff to be pleasing, and it is readily injured by rain. On the other hand, the plant with a stalk too weak to support the flower, such as we see in 'Mrs. Foley Hobbs,' 'Bessie Brown,' and usually in 'British Queen,' is even more objectionable. These head-hangers are of no value in the garden, and only useful for cutting for the exhibition box, where they can be supported with a wire, or when they can be thrust into a specimen vase to ornament the house. For the latter purpose resort is sometimes had to the help of a wire, the end of which is pushed into the calyx to keep the head upright; but this is not to be commended, for the wire rapidly rusts in water and discolours the vase.

For our Garden Roses we should seek a type intermediate between these two, with a graceful, fairly upright, but not stiff carriage; and, fortunately, among our modern Roses we shall find no lack of instances.

3. Colour is an important matter in the garden, and great progress in its improvement in Roses has taken place of recent years, notably through the efforts of Mr. McGredy and M. Pernet Ducher. There is no doubt that the popularity of the dwarf Polyanthas and the Ramblers is largely due to the mass of colour they respectively produce. It is almost equally important in the case of the Hybrid Teas and other Roses used for beds and borders.

Two points are important:—(1) The colour should be clear, bright, and decided; a good crimson, yellow, pink, or white are always valuable.

and many of the intermediate shades, such as those between crimson and yellow, which we get in 'Mme. E. Herriot' and 'Henrietta,' look well; but the washy tints of pinkish-white and blush, beautiful as they often look when well arranged, produce comparatively little effect in the garden, and the number of varieties of these colours grown should be severely restricted. (2) The other point is that the colour should be "fast," that is to say, that the variation in colour throughout the season should be as small as possible.

'Sunburst' has many of the characters of a good Garden Rose. It grows well, is of good foliage and habit, and is not fastidious as to soil. I well remember the delight I felt in looking at the first exhibit of it that I saw. The centre of the flowers, a deep golden yellow, slightly paling to the edges, made the vase a beautiful object. Unfortunately, in this country the colour is so woefully uncertain that it becomes useless in the garden. The lovely golden yellow flowers seem only to come occasionally and in hot weather, the large majority varying from dirty white to flowers with pale-yellow centres, and as a garden Rose it is useless.

The crimson Hybrid Teas are usually rather serious offenders in this respect, if we happen to get hot, sunny weather for the second or late summer-flowering. The sun turns the crimson to a bluish tone which is far from pleasing, but improvement in this respect is not impossible. 'Red Cross,' 'Red Letter Day,' Paul's 'Scarlet Climber,' and 'Princess Mary' seem to stand the sun better than many of the older forms.

The yellow Roses, on the other hand, fail at the end of the season, when the October rains seem, as it were, to wash all the colour out of them, and such good Roses as 'Mme. Ravary,' 'Lady Hillingdon,' and 'Mme. Mélanie Soupert' lose all their attractiveness and brightness, appearing dirty white or little better. 'Golden Emblem' and 'Mrs. Wemyss Quin' keep their colour better than most, but the yellows can hardly be said as yet to have achieved a fast colour throughout the season.

4. Continuous and free production of flowers throughout the season is a quality that needs no emphasis. This direction is one in which the Roses of to-day differ most from those of a century ago. Varieties vary very much in this respect, but no Hybrid Teas can be considered in the first rank unless it possesses these qualities in greater or less degree. They are, however, quite distinct qualities and often as the one increases the other decreases.

The Hybrid Tea flowers in a succession of periods, usually fairly well marked, beginning in June and going on till late autumn, sometimes even till Christmas. With some varieties, such as 'General McArthur,' we get a quantity of bloom produced at once. It is free-blooming, the flowers last for a certain time—perhaps a couple of weeks—and the bed then becomes flowerless until the next flowering period arrives, in about a month's time.

In others, and I think I may take for examples 'Mme. E. Herriot,

'Red Letter Day,' 'Mme. Léon Pain,' the new shoots seem to begin pushing up before the old flowering is well begun, and if the bed be a moderate or large one, some flowers will be found upon it even between the successive periods of copious flowering, and there will be flowers there throughout the season. This is continuous-flowering.

5. In an uncertain climate like that of England the substance of the petals is of great importance. Some full flowers, like those of 'Mme. Jules Graveraux,' 'L'Innocence,' and 'La France,' and even those with a smaller number of petals like the 'Duchess of Wellington,' if subjected to a day or two of rain when they are about to open rapidly, turn into balls of rotteness, the outer petals become saturated with water and glued together, and the whole promise of the past weeks is destroyed and useless, fit only for the garden wheelbarrow.

Flowers with petals of good leathery consistency, such as 'Dorothy Page Roberts,' will stand much rain, and even open in showery weather without suffering much, except it may be a few stains on the back of the outer petals.

6. Fragrance is so much an attribute of the Rose that its desirability needs no words of mine. A large proportion of the old Hybrid Perpetuals were delightfully fragrant with the true damask perfume, and their replacement by the Hybrid Teas has in this respect been something of a loss to our gardens. The damask perfume was so pronounced in most of the crimson Hybrid Perpetuals that it was perhaps natural to expect to find it among those of the Hybrid Teas which acquired this colour. We do get a fine perfume from 'General McArthur,' and we find it rather less pronounced but still good in 'Richmond' and 'Princess Mary' (single); but, speaking generally, the well-known Rose fragrance in this group appears to be coming in the pinks rather than the crimsons. I need only mention 'Mrs. Bryce Allen,' 'Colcestria,' 'Mrs. George Norwood,' 'Gustave Grunerwald,' 'Lady Alice Stanley,' and 'Queen of Fragrance,' all pink flowers, as examples of cases, where the Rose fragrance is particularly well marked, to illustrate this view.

As a class the yellows are not strong in fragrance. I think a Rose exhibited to-day called 'Henry Weller' is the first case I have noticed, and 'Frau Karl Druschki,' the most popular white rose, has practically none.

Of course the damask perfume is far from being the only rose scent. There is the Tea perfume, the musk or honey scent, the fruity odour to be found in many, particularly of the salmon and pinky-yellow forms—at least, I am told so, for I can appreciate this fruity scent myself but little, and in fact I incline to think that these scents are never so satisfying as the full damask, and, though not to be despised and occasionally even delightful, fall short of the odour we expect and really relish in the Rose.

Fragrance is often absent from the bunch-flowered Roses. Most of the climbing Roses first introduced, 'Crimson Rambler,' 'Dorothy Perkins' and the like, were not remarkable for perfume; but there

is one of the later Wichuraianas which possesses it to such a degree that I cannot pass it over. This is 'Evangeline,' a pale pink with white centre, of which the odour is so strong when in flower that on a July or August evening it will fill all the garden. Among the dwarf Polyanthas perhaps the only one possessing distinct fragrance is 'Ellen Poulsen.'

7. The plant must grow well or it is useless. No quality is so essential. How many lovely roses we have had which have been discarded for this reason! From 'Souvenir d'Élise Vardón' down to 'Mrs. Charles Pearson' we have admired them, bought them, planted them, budded them—all to little purpose. They will not grow, and there is an end.

8. The habit of the plant is important, and for garden decoration a plant of good branching habit, readily throwing up young shoots from the base or near it, is to be preferred.

If we trace the history of almost any young Rose shoot it continues growing at the apex until a flower is formed, when growth in length ceases, and sooner or later other buds behind the terminal flower-bud begin to grow. In many of the summer-flowering Roses the terminal flower is not produced till the following year, and we get the so-called sterile shoots, well known in the Briar Rose, the lower buds pushing lateral flower buds almost simultaneously with the formation of the terminal flower.

In the Ramblers and Wichuraianas, on the formation of the terminal flower-spike, one of the lower buds pushes to form the sterile continuing laterals, which, if allowed, will bear the flowers of the following year. In the Hybrid Perpetuals after the summer flowering we get strong, straight, upright shoots produced, on many of which a terminal flower forms in autumn, and if this be bent down, flowering laterals will be produced along its length in the following year.

It is characteristic of many of the Hybrid Teas and some Teas after the summer flowering to push up from near the base a single strong flowering spike, which seems for the time being to absorb all the energy of the plant, making the plant one-sided in appearance, a habit that requires correcting at pruning time.

Most of the strong-growing Teas, Chinas, and dwarf Polyanthas branch well and freely from the base, and readily form large bushes if allowed, and where considerations of space permit look very well in the garden when allowed to grow freely.

9. Good foliage is a great asset in a Garden Rose. Its character varies greatly in different varieties, both in texture and colour, and also in the shape and number of the leaflets.

In the Hybrid Perpetuals the surface is always matt or more or less dull, while the colour may vary from the light greens of 'Mrs. John Laing' and 'Mrs. R. G. Sharman Crawford' to the darker green of 'Horace Vernet' or the dark reddish tint of the young foliage in 'Hugh Dickson.'

In the Hybrid Teas the surface varies from the matt surface found in 'Avoca' to the dark green shiny glistening surface of 'Mme. Edouard Herriot,' 'Mme. Ravary,' and 'Mrs. Wemyss Quin.' In some, too, the young shoots are a particularly beautiful red or bronze, and in this respect few, if any, surpass 'Gruss an Teplitz' and 'Prince de Bulgarie.'

The Teas again vary from the matt to the shiny surface, but a shiny surface predominates.

In the Ramblers and Wichuraianas we find a similar variation from the matt and usually lighter green of 'Crimson Rambler' and 'Dorothy Perkins' to the dark shiny foliage of 'American Pillar,' 'Shower of Gold,' and 'Emily Gray'; while we find specially beautiful ruddy tinted foliage in 'François Juranville,' Mr. Pemberton's 'Moonlight,' and 'Zephyrine Drouhin.'

The character of the surface is of importance in considering the capacity of the plants to resist disease. Few Roses with shiny foliage suffer much from mildew, though I believe it is a mistake to describe any Rose as immune, and still fewer suffer from red rust.

Shiny foliage, however, seems to be little protection against black-spot, some of the shiniest, such as 'Rayon d'Or,' being highly susceptible to this disease.

In bright sunny weather timely applications of powdered sulphur, with or without arsenic, seems to be practically an efficient control for both mildew and black-spot, and greatly lessens liability to red-rust.

During a continuance of wet weather, powder and liquid sprays are alike useless, and resort must be had, if really necessary, to lime sulphur or Bordeaux mixture, both of which stick but disfigure the foliage. I prefer the former, but neither is quite satisfactory.

Fungus disease is very largely dependent on the surroundings of the Rose garden and may be scarcely noticed in an open position where the wind blows free, while a confined atmosphere enables it to spread readily.

10. The longevity of Rose plants varies with the variety employed, the care taken in the original preparation of the bed, the soil and situation and the cultivation. One garden will suit a particular variety better than another, and it is rash to generalize. I have, however, noticed that in my own garden the following varieties, all good ones, require replacements from time to time: 'Mme. Abel Chatenay,' 'A. R. Goodwin,' 'Mrs. W. J. Grant,' and rather less frequently 'Richmond.'

But I think there is a certain amount of luck in this respect in the plants one happens to get, or some qualities of soil or situation. A bed of 'Richmond' containing about twenty plants first planted fifteen years ago has had no renewals, and is the most satisfactory of the three similar beds in my garden. Another, put in some years later, has required some fresh plants, while the most recently planted, seven or eight years old, is the least satisfactory.

Among the Hybrid Perpetuals 'Horace Vernet' is an example of a short-lived plant.

As examples of long-lived varieties I may take 'Mrs. John Laing,' 'Hugh Dickson,' 'Frau Karl Druschki.' It remains to apply the considerations we have been discussing to our existing varieties, with the warning that as Roses behave differently in different gardens, my conclusions can only represent my own experience, and may not always be of general application.

Of the *Crimsons* two of the most brilliant are 'Red Cross' and Paul's 'Scarlet Climber.' These appear to me to stand the sun better than most other Roses of this colour. Neither has much, if any, fragrance.

'Red Cross' has a pretty shape when first opened, but loses it rapidly, while the 'Scarlet Climber' is lacking in form and is not really a climber, but makes a good pillar or bush. 'Red Letter Day,' nearly single, stands sun and grows well, and flowers freely and continuously, but lacks form and fragrance. 'K. of K.' is very similar, but has not grown quite so well with me. 'Princess Mary' has fragrance, but has not flowered freely until this year. Most of the Crimson Hybrid Teas are apt to turn bluish in hot sun. Of this shade 'Richmond' is still my best bedding Rose and has some fragrance, and 'Mrs. Edward Powell' comes next. 'General McArthur' possesses fragrance, but lacks form unless disbudded. It is good during its discontinuous periods of flowering. A new-comer, 'Covent Garden,' seems promising in this class, and, so far as I can judge, does not require disbudding.

'Avoca' and 'Hugh Dickson' are perhaps best pegged down. When disbudded they have form and are also fragrant. While for a large bush or dwarf climber 'Gruss an Teplitz' is excellent, having fragrance, good colour, and lovely foliage, though little form.

'Victor Hugo' should still be grown for its colour and perfume, though it doubtless produces too many malformed flowers, while 'Augustus Hartmann' and 'Ecarlate' give fine colouring.

Of the very numerous *pinks* I would select the old forms, 'Caroline Testout,' 'Gustave Grunerwald,' and 'Lady Ashtown,' and the bicolor 'Mrs. E. G. Hill' for general good qualities; 'C. E. Shea' and 'Dorothy Page Roberts' for their colour, and 'Mrs. Bryce Allen' for its fragrance, and the bedding Tea 'Mme. Henri Berger' for its pretty shape. This Rose is most effective when grown on a south wall up to 6 or 7 feet high.

'Mme. Maurice de Luze' is a good Rose of the Exhibition type, and 'Mrs. J. H. Welsh' is remarkable for its size and distinct form, while the single 'Irish Elegance' is grown everywhere. Of Strawberry tints the two best seem to me to be 'Mme. Edouard Herriot' and 'Henrietta.' The former is the most free-flowering, the latter has beautiful foliage, but both lack fragrance.

Of the all too numerous varieties between white and pink I conceive the best to be 'Pharisaer,' 'Ophelia,' 'Mrs. Theodore

Roosevelt,' 'Mme. Léon Pain,' 'René Wilmart,' 'Urban,' and 'La Tosca,' to which perhaps 'Mrs. Elisha Hicks' might be added for its fragrance.

Good whites are scarce, and 'Frau Karl Druschki' is still the best of its type. 'Mme. Jules Bouche' is a good free-flowering Garden Rose but papery in petal, and the bedding Tea 'Mrs. Herbert Stevens' is without a serious rival, but 'Molly Sharman Crawford,' though a little papery in petal, is a good Garden Rose.

Coming to flowers containing shades of orange and yellow, few of them with any fragrance, I may include 'Joseph Hill,' 'Mme. Mélanie Soupert,' including the climbing variety, which is excellent, 'Prince de Bulgarie' and 'Betty,' the two last named rather liable to black-spot, and for its fine colour 'Arthur R. Goodwin.'

As a big bush we have the nankeen yellow 'Gustave Regis' with its dwarf counterpart 'Mme. Pernet Ducher.' 'Joanna Bridge' is pretty in the bud and grows well, but the flower is very fleeting.

Lastly, the yellows. Over a lengthened trial I think 'Mme. Ravary' the best of the old varieties, and 'Mrs. Wemyss Quin' much brighter in colour, of the new. The bedding Tea 'Lady Hillingdon' should be included.

'Golden Emblem' and 'Constance' are good during their flowering, but so far this has not proved sufficiently continuous in my garden.

It is impossible to pass over 'Rayon d'Or.' Its colour is quite distinct and very conspicuous, but its habit of dying back will prevent it having any long life in our gardens unless a cure can be found. It has little beauty of form.

Climbing and Bunch-flower Roses.

Of crimson shades the earliest is Paul's 'Carmine Pillar,' often out by the end of May but not autumnal. Perhaps the most effective is 'Excelsa,' with little form but closely packed heads of blossom. Travelling through the villages in summer it is interesting to notice how this Rose is replacing the earlier-flowering 'Crimson Rambler' in the cottage gardens. This is followed in time of flowering by 'Hiawatha,' which has a whitish eye and is single, coming to its best just as 'Excelsa' is going over; 'Coronation,' with white eye, coming still later.

'Diabolo' is a better and deeper colour and form, but not nearly so free in flowering, and makes long, rather brittle arms, which are a trifle difficult to deal with.

'François Crousse' is larger-flowered, belonging to the Hybrid Tea section. It becomes too leggy as a pillar, but does well on south wall. 'Ard's Rambler,' 'Ard's Rover,' and 'Ard's Pillar' are useful Roses of this colour, 'Ard's Rover' being the easiest of the three to manage.

Between crimson and pink comes 'Reine Olga de Wurtemberg.'

a Hybrid Tea with *setigera* blood in it ; it is a very useful climber and good both early and late.

Of the pink climbers 'Tea Rambler,' 'Blush Rambler,' and 'Dorothy Perkins' give a useful succession, flowering in the order named, while 'American Pillar' is perhaps the most effective climber we have. It has dark, glossy foliage and single flowers with a white eye. Two pretty single-flowered climbers flowering rather early are 'Flora Mitton' and 'Mrs. Rosalie Wrinch,' the latter possessing rather large flowers, while 'Dawn,' which is nearly single, is useful for decoration.

Other good pink climbers are 'Chatillon Rambler,' 'Ethel,' and 'Tausendschön,' while 'Léontine Gervais,' which has a tinge of yellow in the pink, has sometimes quite a pretty shape, and with this I should name 'François Juranville' as being distinctly fragrant. One of the most delightfully fragrant pink roses with beautiful foliage and nicely formed flowers is the Bourbon 'Zéphyrine Drouhin.' It is not a true climber, but will make a beautiful hedge up to 6 feet or so, or can be grown as a large bush. It has the advantage of being nearly thornless. 'Christine Wright' and the Australian 'Rosy Morn' are large-flowered varieties very showy in the garden. Among shades between white and pink I have already referred to 'Evangeline' for its delightful fragrance. 'Lady Godiva,' a sport from 'Dorothy Perkins,' is a pretty soft shade of pale pink, and 'Dorothy Dennison,' said to be a seedling, is rather like it.

'Sweetheart' is a pretty little bunch-flowered Rose, while 'Flora' looks well early in the year.

'Paul Transon' is worth growing, having good foliage and a distinct autumn flowering.

White climbers are rather numerous. Of the large-flowered type 'Mme. Alfred Carrière' is of the best ; the flowers are profuse if properly pruned and trained, fairly well formed, with a fragrance of their own, and the plant flowers again in autumn. It is a great favourite on church walls, and this is the best way to grow it.

'Purity' is one of the best white climbers, and after its journey to America is now obtainable in this country. It is a hybrid Wichuraiana with large flowers for the type and quite a number of adventitious blossoms in autumn. Of the closer-flowered forms, perhaps the best is 'Sanders White,' 'White Dorothy' being too apt to sport back to its parent. Two strong growers are the hybrid Briar 'Una,' and the hybrid Musk 'The Garland,' either of them, if space be allowed, making a big bush or tangle.

'Silver Moon' has very prettily shaped single flowers, but they are not produced in sufficient quantity to make much show in the garden.

For their freedom the old-fashioned little button-shaped flowers and very vigorous growth 'Dundee Rambler' and 'Félicité et Perpétué' should be remembered.

I will mention here Mr. Pemberton's 'Moonlight,' a good grower,

though not a true climber. It will make a good hedge, a large bush, or may be planted in a bed and cut down annually. It has lovely foliage, and is both free and continuous in flowering.

Between white and yellow are two excellent *Wichuraianas* with fair-sized flowers, often quite well-shaped, 'Alberic Barbier' and 'Gardenia,' the latter rather deeper in colour.

Paul's 'Lemon Pillar' only flowers once, but nearly every flower is beautifully formed. The flowers are large and of good substance, while the plant will make an 8-ft. pillar or large bush, and would, no doubt, do well on a wall.

'Goldfinch' is a free-growing Rambler with pretty yellow buds opening to whitish flowers. Of real yellows I need only name two. Both have good glossy foliage, and look well even when not in flower. 'Shower of Gold' has small flowers, while 'Emily Gray,' raised by Dr. Williams, has rather large semi-double flowers, often very prettily shaped. It is one of the greatest acquisitions to this group we have had recently.

Coming to the dwarf *Polyanthas*, which are so useful for formal beds, the most effective in producing colour-effect throughout the season seem to be :

Crimson or nearly so—'Jessie.'

Shades of pink—'Mrs. W. H. Cutbush,' 'Ellen Poulsen,' 'Orleans Rose,' and 'Maman Turbat.'

White—'Katherine Zeimatt' and 'Little Meg,' the latter having rather larger flowers than the first, often of quite a pretty shade.

Shades of yellow and pink—'Tiptop' and 'Coronet,' both pretty little Roses.

Of yellows we have none at present in this group, the nearest being 'Canarienvogel' and 'Georges Elger.'

The Chinas rely entirely on their colour, having little claim to form, the best in this respect being 'Queen Mab.'

Good crimsons are : 'Château de Clos Vougeot,' 'Princess de Sagen,' 'Fabvier,' 'Cramoisie supérieur,' and 'Charlotte Klemm.'

Pinks—'Old pink China,' 'Mme. Eugène Resal,' 'Mlle. de La Vallette,' and 'Laurette Messimy.'

Whites—'Ducher' and 'Rival de Pæstum.'

Yellow shades—'Titania,' 'Arethusa,' and 'Comtesse de Cayla.'

It is a great mistake to prune them severely in spring; they look much better as big bushes, pruned in summer to a limited extent.

PIONEER WORK IN NIGERIA: THE SOKOTO GARDENS.

By ROSE LAMARTINE YATES, L.C.C., F.R.H.S.

SOME five years ago in Sokoto, a small north-westerly station in the Northern Provinces of Nigeria, on the west coast of Africa, was sown the seed of a great endeavour.

The European community at that time consisted of some dozen persons, and the Medical Officer, Dr. BERNARD MOISER, realizing from previous experience how greatly their health would benefit by the introduction of green vegetables into their dietary, conceived the idea of making a garden there as he had in other stations. It seemed an unrealizable dream. Not only was the climate unfavourable, but there were no tools, no labour, no suitable ground.

Sokoto is about 13° north of the Equator and 5° east of Greenwich. The climate is tropical, and has fairly well-defined seasons. The rainy season lasts from April till the end of September, the rest of the year sees scarcely a drop of rain. The total rainfall for the year averages 25 inches, distributed thus: April, 1; May, 2; June, 4; July, 6.5; August, 8.5; September, 3.

The advent of the rainy season is heralded by violent tornados, or dust-storms, during which a few drops only of rain fall, and the landscape is obliterated by volumes of dust, driven sky-high by the force of the gale. It is interesting to watch the approach of the first tornado of the year. A slight rumble is heard far away in the east, then a low sandy cloud is seen gradually rising from the horizon. It grows rapidly until one seems to see approaching a solid wall of sandstone cut into great rifts, as if carved out by torrents of water. Then in a moment, from complete calm and bright sunshine, one stands enveloped in a hurricane of fine dust and sand. The sun is blotted out, one can only see a few yards and runs for shelter to escape the stinging storm. A fortnight may intervene before another such, then they become more frequent, until in July and August the rain falls in heavy downpours, lasting a couple of hours or more—every three or four days—usually in the evening, but sometimes till daylight. One storm yielded in three hours a rainfall of 4.5 inches!

Between the storms fine sunny weather prevails, not unlike a hot English summer, but the humidity registers 75 to 80 per cent., and falls to 20 per cent. in the dry season of January to March. After the rains there is a short hot season, lasting well into November, when the wind, which has been S.W. all through the rains, suddenly changes to N.E., and remains at this point till the end of March, when it reverts to S.W. A cold season sets in with the change of wind; at Christmas the nights are quite cold, the heat returning with the March S.W. winds, and becoming more and more intense as April yields to May,



FIG. 190. *MAGNOLIA VEITCHII*.



FIG. 191.—OLD VITEX CIENKOWSKI TREES IN THE SOKOTO GARDEN.

The walk in the background leads to the Station.

(P. 336.)

[To face p. 337.]

when the heat becomes so dry and scorching—as from an oven door—that it withers the vegetation. The dry season is called the Harmattan, on account of the whitish haze which persists day after day, covering everything with a fine white powder. (This is said to be caught up by the wind during its passage across the Sahara.) The wind blows with considerable force from dawn onwards, depositing sand in banks behind every obstruction, but dies down at sunset.

In such a climate faith and enthusiasm alone could even *think* a garden. Any possibility of its realization depended on the choice of the position.

The Sokoto country is open, undulating and sandy, and is broken up by long lines of flat-topped ironstone hills (laterite), ending abruptly as they approach the great river valley. These hills are inhabited by hyænas and monkeys, and, till recently, by leopards. A unique feature of the undulating country is its long winding, open, shallow valleys, shaded by a few tall trees, and rounded off at their heads by beautiful green, grassy amphitheatres. Down these valleys run perennial streams fed by springs of wonderfully clear water, which bubbles out of the soil, generally at the foot of an outcrop of laterite. Within the Sokoto station boundary itself are the heads of two such valleys, which, joining, pass into the great valley of the Sokoto river some three miles away. The more northerly of these was some years ago the site of a small garden, but the water has dried up, and is now quite ten feet below the surface.

The other valley bounding the station on the west, with its sparkling springs, has yielded to cultivation, and proved an ideal position for a garden, ornamental as well as useful. It is part of this valley which has been taken in hand seriously by Dr. BERNARD MOISER during the last five years, and now gives an abundance of English vegetables and flowers throughout the year, and comprises lawns and shady walks, nooks and corners that would grace any garden in the homeland.

Verily! the desert has been made to blossom. When all the rest of the country is baked hard and scorched brown, one can saunter there in the grateful shady coolness of the trees, or sit in trellised bowers, transplanted into a little world of greenery and fragrance.

The garden valley runs roughly north and south, and varies in width from 100 to 150 yards, with gently sloping sides, and the little stream meanders along the trough. It is evergreen. Here and there clumps of very fine old trees, *Vitex Cienkowski* (in Hausa, 'Dinya'), with gnarled hollow stems supporting the great shady leafage above, grow on the banks (fig. 191). Amongst them are some rough-leaved fig-trees (*Ficus gnaphalocarpa*?) (in Hausa, 'Baure'). Lower down is a long line of Egyptian Mimosa trees (*Acacia arabica*) (in Hausa, 'Bagaruwa'), which not only are very pleasing with their masses of little yellow flowers, but produce jointed pods used in tanning, and provide just the right amount of shade for growing Dahlias. On the opposite side are a couple of big African Locust

Bean trees (*Parkia filicoidea*) (in Hausa, 'Dorowa') with hanging balls of deep-red flowers, and stately branches, from which now the hammocks swing. Behind is a grand old Baobab (*Adansonia digitata*) (in Hausa, 'Kuka'), round which the native weaves many a weird fairy tale. Farther down are some spreading leguminous trees (*Bauhinia rufescens*) (in Hausa, 'Jirga'), under the shade of which a little alcove has been cut out of the bank. Another tree found on the spot was *Acacia albida* (in Hausa, 'Gawo'). On the banks, too, are clumps of small, smooth-barked trees with lovely pink flowers and long narrow pods (*Stereospermum Kunthianum* Bignoniaceæ) (in Hausa, 'Sansanni'), which so far have defied all efforts to propagate. Its roots travel horizontally a few inches below the surface; portions of the roots have been cut, planted, and have sent up shoots, but have never lived long. Seed has been sown and has germinated, but has never survived the seedling stage. The best way to make a clump grow larger is to dig a trench round it, causing many shoots to spring up from the cut roots. But successful propagation still baffles! One other hopeful indigenous assistance to the formation of a garden was the presence of a beautiful grass (*Cynodon dactylon*) (in Hausa, 'Kiri kiri'), which was later to be moulded into lawns. It should also be mentioned that the large number of horses and cows in connexion with the station made the acquisition of manure an easy matter. Dried blood and dried fish were at hand also, which with his knowledge of organic chemistry the Medical Officer could turn to fullest use.

Other indigenous trees and plants found on the spot were :

Ficus Thonningii (Hausa, 'Chediya'), a thick-leaved shade tree.
Gloriosa superba (Hausa, 'Baurairai'), a climbing lily with reflex crimson and yellow flowers.

Momordica balsamina (Hausa, 'Garafuni'), a dainty climber with deeply cut leaves and yellow flowers, and orange-yellow fruit covered with tubercles.

Colocasia antiquorum (Hausa, 'Gwaza'), an aroid plant with very large arrow-head leaves, grown for the starchy tuber.

Pancratium trianthum (Hausa, 'Hatsin manoma'), beautiful white lily-like gossamer flowers appearing in the early rains.

So much for the co-operation of Nature!

But the natural obstacles, nevertheless, seemed insuperable! On each side of the stream were boggy swamps, thick with coarse rank grass and rushes, the home of snakes and mosquitos. There were the old discarded ridges of native cultivation of the sweet potato (*Ipomoea Batatas*).

On the other hand, on a small patch of ground called the "Waff" (West African Field Force) Garden, at the edge of the stream, a few abortive attempts had been made by European military officers to grow British vegetables. The Medical Officer's previous experience here came to the rescue, and his spare time was henceforth devoted

to rectifying mistakes, and creating what now exists. The first step was to reorganize this experiment on more scientific lines. The native method of growing on high ridges interspersed by water channels had been followed and the ridges even stone-bound. Henceforth these were to be levelled, the stones removed, the water-holes filled up, and the ground more profitably utilized.

This patch was in fact the embryo garden.

Over a thorn barrier was another little attempt known as the "Prison Garden" with Tanko, the warder, in charge of two prisoners. Away went the thorn fence! Developments began! Tanko, the enthusiast, with his two prisoners and their native tools, became the garden warder and workers! (Fig. 192.)

A survey of the slopes each side of the stream soon revealed to Dr. MOISER great possibilities, and a glimpse of distance through a break in a group of trees suggested an "Avenue" (fig. 193). The making of this involved levelling, filling in water-holes, edging with rough blocks of native laterite, and cambering with laterite crushed into gravel, over rubble duly beaten (called "debbi") by native women, gathered from the town at 1d. per day, there being as yet no rollers. Women are the experts at "debbi," which they do singing and beating in rhythm the while. Increased enthusiasm followed each successful step! The stream was bridged by native palm-tree trunks; its bed was deepened for drainage, and the area of cultivation was extended to include drier ground to cope with rainy seasons. Next came the West Walk, forming a boundary from the condenser, which was placed by the side of the main spring, and side-walks were added to enclose the two main vegetable-gardens. All these walks were edged with *Alternanthera* bordered by flower-beds, backed by hedges of *Lawsonia alba*, for ever giving off its delicate sweet scent. The original purpose of the garden was now achieved. Vegetables were obtainable! (See fig. 194.) Good seed from England and patient toil were overcoming all difficulties.

But the strain of Nigerian residence is not only physical, it is also mental and nervous. To supply the need of the mind therefore, the restful element, the subtle calm born of home conditions, the mental focus on the beautiful, the Medical Officer conceived the elaboration of the stream bed into a garden, not only of dietary utility, but of ornament, with soothing sward and shade to act as a nerve sedative.

The first objective, then, was a level lawn, which should combine the beneficial influence of fresh green grass amidst scorched-up surroundings with a gentle form of sport—the idea of bowls, finally giving way to Badminton. Thus the Badminton court with its curved flower-borders, its beautifully kept turf—the native species of grass being used—was patiently evolved. To obtain the full benefit, however, a sense of seclusion was essential, hence arches and trellis of split palm trunks, covered with creepers, such as *Convolvulus major*, red star creeper, *Bougainvillea*, *Cobaea scandens*,

Moonflowers, Heliotrope, *Lophospermum scandens*, *Gloriosa superba*, blue *Clitoria*, *Mina lobata*, *Antigonon leptopus* ('coral creeper'), *Thunbergia*, and various climbing beans, as well as a thick belt of bananas and palms, were introduced, entirely enclosing the court. A suitable approach from the Avenue was made by the erection of a pergola of creepers (fig. 195).

Still a further effort was made to give variety of restfulness. The old prison garden, referred to above, had meanwhile been used for raising seedlings under sloped matting shelters. These were all moved farther away, the ground made hard by "debby," and an enclosed Dutch garden with shaped flower-beds substituted. In the centre of this the banks of the stream were dug out to make a pond, with steps, on one side straight, on the other curved, with seats each side from which fish and water-lilies could be viewed at leisure (fig. 196). An archway from one side connects it with the Avenue; a seat in the pergola gives a view of it from the other side (fig. 197).

A further ornamental development originated as a pest preventive. A little distance away, a group of Pomelo trees seemed to harbour swarms of grasshoppers, and to avoid the real danger of their encroaching upon the cultivated garden, a wide grass road was carried right across from east to west, and flanked by horse-radish trees (*Moringa pterygosperma* (in Hausa, 'Zogalagandi'). These would not thrive in the trough of the valley, so they were made to give place to Cassava (*Manihot palmata*), forming a dense, rounded evergreen hedge. This road served the further purpose of affording a suitable crossing of the garden for horsemen. To link this up with the Badminton court a short grass walk was made, called "Peggy Pass," and lined with *Duranta Ellisii* and *D. Plumerii*. The intervening ground was devoted to the cultivation of tomatoes, and, on the soil proving too damp, to cabbages, and bananas on the damper slope; also, experimental sugar-cane tests were made here.

The work had now so developed that more labour was essential, and, the public utility and service of the garden having gradually become recognized by the Resident, Mr. E. J. ARNETT,* who had all through been most sympathetic and helpful in the effort, a further supply of prison labour was granted from the Town prison.

This was the turning-point in the development of the garden. The Governor, Sir FREDERICK LUGARD, visited it at this stage, two years after the conception of the idea, and gave it official recognition by sanctioning the grant of a nominal payment to the native administration for their prison labour.

The work was temporarily interrupted by the Medical Officer returning to England on leave, and being torpedoed *en route*. During his absence an interesting experiment was accidentally made. An Assistant District Officer, anxious to provide a supply of palm-poles, had sown a number of palm-seeds. No record of this having been left for Dr. MOISER's information on his return, he planted the same

* Now Lieutenant-Governor.

plot of ground with bananas, before the germination of the palm seeds, two years later. It was the growth and shade of the bananas which alone made it possible for the palms to spring up and thrive. Since then palms have been freely planted amongst the bananas along the stream edge. As bananas should be removed in their fifth year, the palms will clothe the vacant places thus created.

It was during this leave that Dr. MOISER became a Fellow of the Royal Horticultural Society, a fresh incentive to renewed effort, and through the kindness of its Secretary, the Rev. W. WILKS, was put in touch with tropical and other botanical gardens in Ceylon, Singapore, and elsewhere, from which he was able to obtain several specimens of flowers and fruits hitherto unknown in Nigeria. Among these many failed, but a special type of guava has thrived wonderfully, also *Torenia Fournieri*, and scarlet *Salvia*, which had not succeeded from English seed. This further development of the garden necessitated improvising seed-pans and flower-pots. For seed-pans kerosene tins cut in two were made to serve, and entirely baffled the aggressive white ant. Flower-pots were made by the native potters from an English model. Native tools also had to be augmented by introductions from England, the digging-fork proving much more useful than the spade, and the long-handled hoe than the short native type. Success in cultivation could only be achieved at every step by repeated experiments and frequent disappointments. Plants obtained only with difficulty and at great cost very often died off, seed did not come up or failed to thrive, and had to be given other conditions of growth, until the favourable one was discovered. One such case, however, proved specially encouraging. A root of *Alternanthera* had been brought from Zaria; it apparently withered away, one tiny sprig only surviving, and from that, in eighteen months, the whole garden has been able to be supplied with handsome luxuriant edging, kept clipped like box edging.

The lay out of the remainder of the valley head was now under consideration. The marked result in interest and health of supplying the Badminton court, suggested and justified the making and levelling of a Croquet-lawn (see fig. 198), flanked by a long 20-feet wide Terrace. The Terrace was continued as "The Rye" across and beyond the Grass Ride; a long winding curved walk, called the "Inner Circle," flanked by stones and *Alternanthera* edging, bordered this lawn, crossing the stream and leading across the opposite slope, still of long grass, to the "B-K Road." The lay out of these walks was tedious work, each stone being placed under the personal direction of Dr. MOISER, to ensure a uniform curve being maintained and the stone's best facet in each case being utilised. Masses of flowering bushes with broad borders of perennial flowers, amongst them being Marvel of Peru, which blossoms very freely in all its varieties, were planted in the space between the Croquet-lawn and the Grass Ride. Here the bananas will be transplanted when their five years' occupation of the stream edge is completed. Lastly, a broad,

curved, shady walk was made from the station under the big *Vitex* trees (fig. 191) to the Terrace, crossing the stream by diverging sections encircling a small pond, made of its running water, and finally mounting the opposite slope to the main Road. A fence of edible lime was planted to enclose the garden on the south. Beyond this to the head of the valley the ground is left to grow its natural grass, used for grazing and fodder. Beyond the north boundary a forest has been planted—with the twofold object of increasing the rainfall and fuel supply—and an orange grove has been started with deep trenches to drain the swamp, and further developments depend upon more labour being forthcoming. The future holds the probability of bees and their accompanying field of clover being introduced, if clover can be persuaded to grow, and bees to survive the journey and acclimatize themselves; also a hard tennis court, a lawn-tennis court, and the cultivation of, amongst other experiments, climbing roses, watercress, hydrangeas, begonias, maidenhair fern, and *Selaginella*, to take the place of moss in hanging baskets; in fact, nothing which can ameliorate the conditions of life in Northern Nigeria is going to be left untried by this enterprising Medical Officer.

One of the serious lacks in European residence in Nigeria, as in most tropical climes, is continuity of interest. The bird-of-passage system is not conducive to this, and is therefore inimical to health; yet the mind of the human being requires it in an accentuated form to compensate for the unnatural isolation from home surroundings. This the cultivation of the beautiful ever-growing garden supplies, this the seasonal sports supply, this the cultivation and anticipation of fruit and vegetable supply. It is nature's tonic to the strained nervous system. The fresh fruit and vegetables provide the purely physical need, and at the same time interest and mental focus are secured—a medical achievement of no small value.

The garden has achieved *more*.

It has far outgrown its original purpose. It has established itself as a self-supporting market. The Europeans contribute a fixed sum and receive regular daily supplies. All its heavy initial expense was from the Doctor's own pocket—the gift to humanity of the energy, thought, spare time, and money of the enthusiast. He began as an inexperienced amateur; he is now generally recognized, after fourteen years' assiduous gardening work in the Northern Provinces, to be the outstanding amateur expert garden maker and cultivator of Nigeria.

The garden has supplied an opportunity of watching an experiment in prison reform all unconsciously initiated; for prisoners to work under such beautiful surroundings must have its uplifting effect. It has provided health—through diet—and mental health through beauty, restful outlook, and continuous change and variety. It has provided the means of sociable recreation under unique conditions so valuable to colonial life.

It has supplied a horticultural need and education to native and European alike. It is a great object-lesson to native chiefs and

commoners, who visit it during the year and taste of its fruits with delight, taking away specimens to their own compounds, and always returning for more. The schoolboys ask permission to enter and admire its well-swept paths and smart closely-mown lawns, objects wholly unknown and unimagined by them. Some of the chiefs have even sent men to be taught the art of gardening ; they have procured and sent indigenous specimens to be planted ; and experiments are being carried out with the object of introducing new foods for the native, *e.g.* English potatoes as a field crop. Thousands of tomatoes have been given away to king and peasant, many of whom are now learning to grow the plant in their own homes. Hundreds of banana plants are taken away by natives every year and planted ; they come from far to taste the guava, and it is hoped before long they may enjoy oranges, grape fruit, olives, grapes, and, maybe, apricots and almonds.

It has kept at bay the deadly mosquito by the drainage of swamps, and the introduction of fish into the ponds. This great endeavour, originally only a public health service, has acquired even political significance. It is proving no mean factor in cementing the amicable relations between native and protectorate Home Government. It is proving a factor in linking up the scattered points of the Empire where similar horticultural effort is progressing.

In five years it has grown from a lonely, discouraging, hesitant idea into a living work of limitless scope and comprehensive significance, a potent factor in education, ethical and practical, and in successful Empire-building. Thus can the silent patient work of an individual in a lonely home far removed from the whirl of governments mould and influence the destinies of the world !

The possibilities of this garden seem inexhaustible, so long as the Powers-that-be see fit to reappoint the enthusiastic creator of the garden to the station at Sokoto ! *

N.B.—Should any reader be interested in details of culture of individual plants, whether flowers or vegetables, he will find full cultural particulars in a small pamphlet recently written by Dr. BERNARD MOISER at the request of the Kaduna Horticultural Society, and obtainable, we believe, from Mr. ALEX NEILSON, 18 Eldon Street, London, E.C.

LIST OF FLOWERS AND VEGETABLES RAISED FROM SEED.

Those which have succeeded.

Artichoke (Jerusalem).
Aubergine.
Beans (Dwarf French and Runner).
Beet.
Broccoli.
Brussels Sprouts.

Those which have not yet succeeded.

Celery (table).
Peas.
Thyme.

* Dr. Moiser has now returned to Sokoto with four loads of new plants !

LIST OF FLOWERS AND VEGETABLES RAISED FROM SEED (cont.).

*Those which have succeeded.**Those which have not yet succeeded.*

Cabbage.
 Carrots.
 Cauliflower
 Celery (culinary).
 Cress.
 Cucumber.
 Endive.
 Kale.
 Kohl Rabi.
 Lettuce.
 Melon.
 Mint.
 Mustard.
 Parsley.
 Potatos.
 Pumpkin.
 Radish.
 Sage.
 Salsify.
 Spinach.
 Spinach Beet.
 Tomato.
 Turnip.
 Vegetable Marrow.

Ageratum.
 Alyssum.
 Amaranthus.
 Antirrhinum.
Arctotis grandis.
 Balsams.
 Canna.
Celosia plumosa.
 Cockscomb.
 Coleus.
Convolvulus major.
 Coreopsis.
 Cosmea.
 Cuphea.
 Dahlia.
 Datura.
 Dianthus.
 Eschscholzia.
 Gaillardia.
 Geranium.
Gloriosa superba.
 Heliotrope.
 Lobelia.
Lophospermum scandens.
 Marigold.
 Marvel of Peru.
Mina lobata.
 Nasturtium (Dwarf).
 Nicotiana.
 Petunia.
 Portulaca.
 Salpiglossis.
 Salvia—Scarlet, *argentea*, *farinacea*.
Solanum marjoratum.
 Stocks.
 Sunflower.
Thunbergia alata.
Torenia Fourneri (Ceylon seed).

Abutilon.
 Aquilegia.
Asparagus plumosus.
 Asters.
 Begonia.
 Browallia.
Celstia cretica.
Cheiranthus kewensis.
 Calceolaria.
Clerodendron fallax.
 Cornflower.
 Cyperus.
Exacum affine.
Francoa ramosa.
Gerbera Jamesoni.
 Gesnera.
 Gladiolus.
 Gloxinia.
Gilia coronopifolia.
 Hebenstreitia.
 Hollyhock (grows but does not flower).
Impatiens Holstii.
Kochia trichophylla.
Lantana hybrida.
 Lavender.
 Lavatera.
Layla elegans alba.
 Larkspur.
Lathyrus latifolius.
Linum grandiflorum rubrum.
 Mesembryanthemum.
 Mimulus.
 Myrtle.
 Nemesia.
 Nigella.
Perilla nankinensis.
 Pentstemon.
 Phlox.



FIG. 192.—TANKO, THE WARDER, AT NORTH END GATE.
The Fruit Garden is in the background ; the creeper is the large Red Star Creeper,
Ipomoea Inamoclit rosea.



FIG. 193.—THE AVENUE, LOOKING WEST.
Christ Thorn (*Parkinsonia aculeata*) on each side, *Acacia arabica* overhanging.
[To face p. 344.]



FIG. 194.—PART OF THE VEGETABLE GARDEN.

Lettuce, Cabbage, Cauliflower, and Tomatos: The row of *Lawsonia alba* is now a flourishing hedge.



FIG. 195.—THE PERGOLA, LOOKING NORTH.

The climbers are *Convolvulus major*, Moon-flowers and the small Red Star Creeper. Cannas are growing on the right.



FIG. 196.—THE DUTCH GARDEN, FROM THE PERGOLA.

Bananas behind the trellis, and on it *Antigonon leptopus*, *Bougainvillea*, *Clitoria*, Red Star Creeper, *Gloriosa superba*, *Thunbergia*, &c.



FIG. 197.—THE DUTCH GARDEN.

Hibiscus with scarlet *Salvias* in bed in foreground. On extreme right a fine red Rose from England; the pillars of the Pergola covered with *Heliotrope*.



FIG. 198.—THE LAWNS, FROM THE INNER CIRCLE.

The edging of the beds is clipped *Alternanthera*, and the bed on the right contains *Petunias*.

Two prisoners are rolling the croquet lawn and others are at work in the background.

[To face p. 345.

LIST OF FLOWERS AND VEGETABLES RAISED FROM SEED (*cont.*).

Those which have succeeded.

Verbena.
Zinnia.

Those which have not yet succeeded

Primula.
Pyrethrum.
Rehmannia.
Rudbeckia.
Scabious.
Schizanthus.
Smilax.
Streptocarpus.
Sweet Sultan.
Sweet Pea.
Valerian.
Verbascum.
Wigandia.

RAISED FROM BULBS.

Achimenes. Amaryllis. Begonias. Caladium. Freesia. Lachenalia.

N.B.—Roses are still in the experimental stages ; some have done *extremely* well, others have succumbed to water-logging.

PLANTS INTRODUCED TO HORTICULTURE FROM CHILE
AND ARGENTINA (INCLUDING PATAGONIA AND
FUEGIA).

W. B. TURRILL, M.Sc.

THIS list was compiled at the request of Mr. G. W. E. LODER, M.A., F.L.S., F.R.H.S., and is published here with his kind permission.

The following works, among others, have been used in the compilation of the list: G. Nicholson, "Dictionary of Gardening" and supplements; L. H. Bailey, "Standard Cyclopaedia of Horticulture," the *Botanical Magazine*, the lists of new garden plants published in the *Kew Bulletin* up to 1915, and the "Index Kewensis."

The following abbreviated references are used in the list:

B.K.=Blühende Kakteen.	I.S.H.T.=Icones Selectae Horti
B.M.=Botanical Magazine.	Thenensis.
B.R.=Botanical Register.	K.B.=Kew Bulletin.
B.T.O.=Bulletin della R.Società	M.K.=Monatsschrift für Kakteen-
Toscana de Orlicoltura.	kunde.
Gard.=The Garden.	O.R.=Orchid Review.
G.C.=Gardeners' Chronicle.	R.H.=Revue Horticole.
Gfl.=Gartenflora.	W.G.=Wiener Illustrierte Garten-
G.W.=Gardening World.	Zeitung.

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 „ *pulchra* Sims, Chile, 1822. B.M. 2421.
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Jubaea spectabilis H.B. et K., Palmac., Chile, 1843.
Lapageria rosea Ruiz et Pav., and varieties, Liliac., Chile, 1847. B.M. 4447, 4892.
Lardizabala biternata Ruiz et Pav., Lardizabalac., Chile, 1869.
Larrea nitida Cav., Zygophyllac., Buenos Ayres, 1823.
Latace Volkmanni R. Phil., Liliac., Andes of Santa Rosa, 1889.
Latua venosa Phil., Solanac., Chile. B.M. 5373.
Leptocarpus rivularis DC., Compositae, Chile. I.S.H.T. iv. t. 129.
Leuceria runcinata Gill. et D. Don, Compositae, Andes of Chile, 1844. B.M. 4116.
Leucocoryne allitacea Lindl., Liliac., Chile.
 „ *ixioides* Lindl., Chile, 1826. B.M. 2832. B.R. 1293.
Libertia coerulescens Kunth, Iridac., Chile, 1873.
Libocedrus chilensis Endl., Coniferae, Chile.
 „ *tetragona* Endl., Patag., 1849.
Lippia citriodora H.B. et K., Verbenac., Chile, 1794. B.M. 367.
Lobelia polyphylla Hook. et Arn., Campanulac., Chile, 1835. B.M. 3550.
 „ *Tupa* Linn., Chile, 1824. B.M. 2550.
Lomaria aspera Klotzsch, Filic., Chile and Chiloe.
 „ *blechnioides* Bory, Chile.
 „ *chilensis* Kaulf., Chile.
 „ *Germainii* Hook., Chile.
Lomatia obliqua R. Br., Proteac., Chile. G.C. 1909, xlv. 162.
 „ *ferruginea* R. Br., Chile, 1851.
Luzuriaga erecta Kunth, Liliac., Chile. B.M. 5192.
 „ *marginata* Benth. et Hook. f., Fuegia.
 „ *radicans* Ruiz et Pav., Chile and Peru.
Macfadyena Dolichandra Benth. et Hook. f., Bignoniaceae, Argentina, 1891.
Nicotiana acuminata Hook., Solanac., Valparaiso. B.M. 2919.
 „ *glauca* R. Grah., Buenos Ayres, 1827. B.M. 2837.
 „ *longiflora* Cav., Buenos Ayres, 1832.
 „ *noctiflora* Hook., Chile, 1826. B.M. 2785.
Nierembergia calycina Hook., Solanac., Buenos Ayres, 1834.
 „ *frutescens* Dur., Chile, 1867.
 „ *gracilis* Hook., Buenos Ayres, 1831. B.M. 3108.
 „ *rivularis* Miers, La Plata, 1866. B.M. 5608.
Nolana lanceolata Miers, Solanac., Chile, 1860. B.M. 5327.
 „ *paradoxa* Lindl., Chile, 1825. B.R. 865.
 „ *tenella* Lindl., Chile, 1824. B.M. 2604.

- Nothoclaena tenera* Gill., Filic., Argentina, &c. B.M. 3055.
Nothofagus antarctica Oersted, Cupuliferae, Fuegia, 1830.
 „ *antarctica* Oersted, var. *uliginosa*, Reiche, Chile, 1902. B.M. 8314.
 „ *betuloides* Blume, Fuegia, 1830.
 „ *obliqua* Blume, Chile, K.B. 1906, p. 381. *
Nothoscordum macrostemon Kunth, Liliac., Buenos Ayres, 1827.
 „ *striatellum* Kunth, Chile. B.M. 2419.
Opuntia andicola Hort. Angl., Cactac., Andes of Chile.
 „ *aurantiaca* Lindl., Chile, 1824. B.R. 1606.
 „ *corrugata* Hort. Angl., Chile, 1824.
 „ *Poeppigii* Otto, Chile, 1884.
 „ *Segethi* Phil., Chile, 1884.
 „ *sulphurea* G. Don, Chile, 1827.
 „ *Turpinii* Lem., Chile, 1844.
Ourisia coccinea Pers., Scrophulariac., Andes of Chile, 1862. B.M. 5335.
 „ *Pearcei* Phil., Chile, 1863.
Oxalis adenophylla Gill., Oxalidac., Chile. B.M. 8054.
 „ *arenaria* Bert., Chile, 1875. B.M. 6193.
 „ *carnosa* Molina, Chile, 1825. B.M. 2866. B.R. 1063.
 „ *lasiopetala* Zucc., Buenos Ayres and Monte Video. B.M. 3932.
 „ *lobata* Sims, Chile, 1823. B.M. 2386.
 „ *Martiana* Zucc., Argentina. B.M. 3938.
 „ *rosea* Jacq., Chile, 1823. B.M. 2830. B.R. 1123.
 „ *Simsii* Sweet, Chile. B.M. 2415.
 „ *tortuosa* Lindl., Chile, 1826. B.R. 1249.
 „ *valdiviensis* Barn., Chile, 1826.
Pasithea coerulea D. Don, Liliac., Chile, reintroduced 1889. B.M. 7249.
Peveskia foetens Spegazz., Cactac., Argentina. M.K. 1904, 134.
 „ *Poeppigii* Salm-Dyck, Chile.
 „ *subulata* Muehlenpf., Valparaiso.
Pereskia viscosa Less., Compositae, Chile, 1826. B.M. 5401.
Pernettya angustifolia Lindl., Ericac., Chile. B.R. 1840, 63. B.M. 3889.
 „ *furens*, Klotzsch, Ericac., Chile. B.M. 4920.
 „ *mucronata* Gaudich., and variety, Magellan Straits, 1828. B.R. 1675.
 B.M. 3093.
 „ *Penlandii* DC., Andes, 1875. B.M. 6204.
Petunia intermedia G. Don, Solanac., Buenos Ayres, 1832. B.R. 193. B.M. 3256.
 „ *nyctaginiflora* Juss., Rio Plato, 1823. B.M. 2552.
 „ *violacea* Lindl., Buenos Ayres, 1831. B.M. 3556. B.R. 1626.
Peumus Boldus Molina, Monimiaceae, Chile, 1844. B.R. 1845, 57.
Philesia buxifolia Lam., Liliac., Chile, 1850. B.M. 4738.
Philibertia gracilis D. Don, Asclepiad., Buenos Ayres.
 „ *grandiflora* Hook., Buenos Ayres. B.M. 3618. B.R. 1843, 15.
Pitcairnia spathacea Griseb., Bromeliac., Argentina. B.M. 7966.
Pithecoctenium cynanchoides DC., Bignoniaceae, Brazil to Argentina, 1884. B.M. 8556.
Podocarpus nubigena Lindl., Coniferae, Chile.
Primula magellanica Lehm., Primulac., Chile.
Priva laevis Juss., Verbenac., Argentina, 1833.
Prosopis Siliquastrum DC., Leguminosae, Chile, 1827.
Prumnopitys elegans Phil., Coniferae, Chile.
Pterocactus decipiens Gürke, Cactac., Argentina. M.K. 1907, 145.
 „ *Kuntzei* K. Schum, Argentina. M.K. 1907, 137.
Puya chilensis Molina, Bromeliac., Chile, 1820. B.M. 4715.
Quillaja Saponaria Molina, Rosac., Chile, 1832.
Salpichroa glandulosa Miers, Solanac., Chile, 1844.
Salpiglossis sinuata Ruiz et Pav., Solanac., Chile, 1820.
Sarmienta repens Ruiz et Pav., Gesneriac., Chile, 1862.
Saxegothea conspicua Lindl., Taxac., Chile. B.M. 8664.
Schizanthus candidus Lindl., Solanac., Chile, 1843. B.R. 1843, 45.
 „ *Grahami* Gill., Chile, 1831. B.M. 3044, 3045. B.R. 1544.
 „ *Hookeri* Gill., Chile, 1828. B.M. 3070.
 „ *pinnatus* Ruiz et Pav., Chile, 1822. B.M. 2404. B.R. 725, 1562.
Schizopetalon Walkeri Sims, Cruciferae, Chile, 1821. B.M. 2379. B.R. 752.
Senecio adenotrichus DC., Compositae, Chile, 1826. B.R. 1190.
 „ *argenteus* Kunze, Chile.
 „ *Hualtata* Bert., Chile and Argentina, 1890. B.M. 7422.
 „ *Smithii* DC., S. Chile and Fuegia, 1895. B.M. 7531.

- Solanum crispum* Ruiz et Pav., Solanac., Chile, 1824. B.M. 3795. B.R. 1516.
 „ *tuberosum* Lindl., Chile, 1833. B.R. 1712.
 „ *glaucum* Dun., Buenos Ayres, 1880.
 „ *Maglia* Schlecht, Chile and Peru, 1862. B.M. 6756.
 „ *runcinatum* Ruiz et Pav., Chile, 1839. B.M. 5222.
 „ *Tomatillo* Phil., Chile.
Solaria miersioides Phil., Liliac., Chile, 1871.
Solenomelus chilensis Miers, Iridac., Chile, 1868. B.M. 2965.
Sophora macrocarpa Smith., Leguminosae, Chile. B.M. 8647. B.R. 1798.
Sphacele campanulata Benth., Labiatae, Chile, 1795. B.R. 1382.
 „ *Lindleyi* Benth., Chile, 1825. B.M. 2993. B.R. 1226.
Stigmaphyllon heterophyllum Hook., Malpighiac., Buenos Ayres, 1842. B.M. 4014.
Tacsonia pinnatistipula Juss., Passiflorac., Chile and Peru, 1828. B.M. 4062.
Tecophilaea cyaneo-crocea Baker, Haemodorac., Chile, 1872.
Trichomanes exsectum Kunze, Filic., Chile.
Trichopetalum stellatum Lindl., Liliac., Chile, 1828. B.M. 3084. B.R. 1535.
Tricuspidaria dependens Ruiz et Pav., Tiliac., Central Chile. B.M. 8115.
Trifurcia pulchella Lindl., Iridac., Buenos Ayres, B.M. 3862.
Triteleia Leitchlinii Nichols., Liliac., Chilean Andes, 1873.
 „ *porrifolia* Poepp., Chile, 1868. B.M. 5977.
 „ *uniflora* Lindl., Buenos Ayres, 1836. B.M. 3327.
Trixis senecioides Hook., Compositae, Chile, 1821.
Tropaeolum azureum Miers, Geraniac., Chile, 1842. B.R. xxviii. 65.
 „ *brachyceras* Hook. et Arn., Chile, 1830. B.M. 3851. B.R. 1926.
 „ *edule* Paxt., Chile, 1841.
 „ *pentaphyllum* Lam., Buenos Ayres, 1829. B.K. 3190.
 „ *polyphyllum* Cav., Chile, 1827. B.M. 4042.
 „ *sessilifolium* Poepp. et Endl., Chile, 1868.
 „ *spectosum* Poepp. et Endl., Chile, 1846. B.M. 4323.
 „ *tricolorum* Sweet, Chile, 1828. B.M. 3169. B.R. 1935.
 „ *violaeiflorum* A. Dietr., Chile. B.M. 3985.
Valdivia Gayana Remy, Saxifrag., Chile, 1863.
Verbena sulphurea D. Don, Verbenac., Chile, 1832.
Vestia lycioides Willd., Solanac., Chile, 1815. B.M. 2412. B.R. 299.
Villaresia mucronata Ruiz et Pav., Olacineae, Chile.
Viviania grandifolia Hook. et Arn., Geraniac., Chile, 1832.
 „ *parvifolia* Klotzsch, Chile, 1832.
Weinmannia trichosperma Cav., Saxifragac., Valdivia.
Zephyranthes candida Herb., Amaryllidac., Buenos Ayres, 1822. B.M. 2107.
 „ *mesochloa* Herb., Buenos Ayres, 1825. B.R. 1361.
 „ *pumila* M. Roem., Chile, 1831.

FIRST EARLY POTATOS.

As is well known, Potatos may be arranged in a sequence of first early, second early, maincrop, and late varieties, according to the season at which they come to maturity, *i.e.* at which the amount of crop produced is sufficient to justify digging, and the tubers in such a condition as to be palatable. No hard-and-fast line can be drawn between these divisions, and naturally a number of circumstances combine to determine the exact time at which any variety will be fit to lift.

Apart from the question of variety, and the source of the seed tubers, the main factor is the locality, certain districts being notoriously suitable for the production of early crops, *e.g.* parts of Cornwall (especially the shores of Mount's Bay) and Devon, parts of Cheshire, Ayrshire, and many relatively small areas in other parts of the country. The demand for new potatos in the early part of the season is great, and the price they command high; efforts are therefore naturally made to meet the demand. Unfortunately, the varieties mostly grown to satisfy it, namely 'Epicure,' 'May Queen,' 'Ninetyfold,' and 'Midlothian Early' or 'Duke of York' as it is variously called, are none of them immune from attacks of wart disease, and no other well-known varieties combine the essential qualities of immunity from wart disease and early fitness to lift with high yield and good table quality. In some districts other qualities, such as size of tuber, habit of haulm to permit interplanting with Brassicas, and so on, are looked upon as of first importance, and some efforts have been made to secure new varieties which combine these qualities.

Few of the many new forms raised of late years have proved really first early, but the three that have made the greatest bid for favour up to the present are: 'Arran Rose,' 'Dargill Early,' and 'Broad-leaved Ashleaf.' Full descriptions of these varieties will be found in this JOURNAL, vol. xlv. (p. 360). 'Edzell Blue' has been classed with the first-early section in error; it is not a first early, but should be regarded as a second early; moreover, its deep-purple skin is against it as a market variety, for popular prejudice is all in favour of potatos with little or no colour in the skin and none in the flesh.

With the object of comparing the yielding powers of these varieties with three standard first earlys, arrangements were made to grow at Wisley, in 1920, tubers of all six from stocks grown in 1919 in one locality, so as to eliminate as far as possible chances of error arising from the seed tubers being derived from different sources. By the kindness of Sir MATTHEW WALLACE and Mr. McALISTER, both of Dumfries, this was possible. Very even lots of seed tubers of about 3 oz. weight were received before Christmas of each of these varieties from Dumfries and boxed to sprout. At the same time another set of seed tubers of the same varieties grown at Wisley in 1919 were

also put to sprout. They all sprouted well and were planted on an even piece of ground side by side on April 15, 1920. They grew away well and were lifted half on July 3, the remainder on August 4, and weighed, with the following results:—

Variety.	Source.	Lifted July 3. Twenty Tubers.	Lifted Aug. 4. Twenty Tubers.	Total Produce.
		lb. oz.	lb. oz.	lb. oz.
Epicure	{ Dumfries seed	52 8	72 3	124 11
	{ Wisley seed	32 8	41 11	74 3
Ninetyfold	{ Dumfries seed	53 4	59 5	112 9
	{ Wisley seed	41 15	55 14	97 13
May Queen. . . .	{ Dumfries seed	43 12	67 4	111 0
	{ Wisley seed	25 1	47 3	72 4
Arran Rose	{ Dumfries seed	31 2	42 5	73 7
	{ Wisley seed	27 6	33 11	61 1
Dargill Early	{ Dumfries seed	26 13	39 10	66 7
	{ Wisley seed	22 15	39 4	62 3
Broad-leaved Ashleaf . .	{ Dumfries seed	40 12	47 4	88 0
	{ Wisley seed	27 4	32 12	60 0

The greatest importance attaches, of course, to the result of the July lifting while the tops were still green, and it will be at once seen that the three non-immune varieties are each better in cropping power than either of the three immune, but that of these three the 'Broad-leaved Ashleaf' is the most promising. 'Dargill Early' was still green at the time of the second lifting and will probably not rank as one of the earliest varieties at all. The cropping qualities shown at the early lifting are confirmed in the second.

The comparison of the yields given by the Dumfries seed with those of the Wisley seed serve to emphasize the value of Scotch seed over that once grown in the South, a point that is now fairly well known to most.

'Broad-leaved Ashleaf' appears therefore to be the most promising of the newer varieties as a first early. It is a variety of German origin (there called 'Juni'), quite distinct in every way from 'Myatt's Ashleaf,' and already known by several synonyms in this country (see JOURNAL R.H.S., vol. xlv. p. 364).

In view of the steady irresistible march of wart disease it is very desirable that new varieties of Potatoes should be raised, especially of very early and maincrop varieties (we are fairly well supplied with immune second earlies). It is possible that seeds raised from the crossing of late varieties would produce some early varieties, but probably the greatest hope of success lies in crossing early varieties with one another, especially early varieties of known high yielding qualities. Seed balls are not infrequent on some early varieties like 'Myatt's Ashleaf,' but these are usually the result of self-pollination, and better results would probably be produced by crossing carefully carried out. There seems no doubt that high-yielding qualities are transmissible, but whether immunity to wart disease is has not yet been ascertained.



FIG. 199.—PLUM 'THE CZAR.' SELF-FERTILE.
A, flowers crossed. B, 284 flowers selfed set 62 fruits.

[To face p. 352.]



FIG. 200.—PLUM 'MONARCH.' SELF-FERTILE.
A, flowers crossed, B, 59 flowers selfed set 14 fruits.



FIG. 201.—PLUM 'COMTE D'ALTHAN'S GAGE.' SELF-STERILE.
A, flowers crossed. B, 349 flowers selfed set no fruit.



FIG. 203.—PLUM 'DECAISNE.' SELF-STERILE.
A, flowers crossed. B, 279 flowers selfed set no fruits.

[To face p. 353.]



FIG. 202.—PLUM 'DENNISTON'S SUPERB.' SELF-FERTILE.
All flowers selfed (300 set 102 fruits).

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

XXXVI.—POLLINATION IN ORCHARDS (iv.).*

Self-Fertility and Self-Sterility in Plums.

By A. N. RAWES.

THIS paper is a preliminary account of the investigations being made at Wisley into the self-fertility and self-sterility of the many varieties of plums.

The work was commenced in 1919; and was carried out on pot trees in an orchard house set aside for experiments relating to fruit pollination. The house is specially constructed for this purpose, and by means of mosquito bars over the ventilators and double doors all insects are excluded, and the danger of disturbance from other agencies reduced to a minimum. Two trees of each variety are tested in each case, so that the results are duplicated and not subject to any abnormalities any one tree may be temporarily suffering from. Each flower is hand-pollinated, and both in the case of crossed and selfed flowers pollination is done by means of ripe stamens carried in a pair of forceps and brushed on the stigmas of the flowers to be pollinated. This is believed to be a more accurate and satisfactory method of pollination than by the use of the camel-hair brush. All flowers to be crossed are emasculated before their stamens are ripe or the petals open.

Usually the stigma of the plum flower is in a receptive condition, *i.e.* sticky, a day or two before the stamens are ripe, but this not always so and in some cases both stamens and stigma "ripen" at the same time, whilst in other cases the stamens are occasionally found ripe a day before the stigmas become receptive.

So far eighteen varieties have been tested as to whether they are able to set fruit when pollinated with their own pollen or not, and out of this number—

eleven varieties were found to be self-sterile,
three varieties were found to be self-fertile,
 and *four* varieties were found partly self-fertile.

In the first table on p. 354 are the data from which these conclusions are arrived at.

Comparison between crossed and selfed fruits from a self-fertile variety showed no difference, due to the foreign pollen, either in the size or shape of the fruit or stone; neither was there any difference in the

* For previous articles see *R.H.S. Journal*, 37, p. 350 and 39, p. 366 and p. 615.

degree of colouring or time of ripening of the fruit, but that cross-pollination tends to raise the percentage of fruit setting even in self-fertile varieties the figures in the second table suggest. These figures go to show that interplanting varieties for cross-pollination, in the plantation or garden, should be the rule whether the varieties grown

SELF-STERILE—			
Coe's Golden Drop	221 flowers, selfed	set	o fruit
Decaïsne	279 " "	"	o "
Grand Duke	313 " "	"	o "
Jefferson	187 " "	"	o "
Kirke's Blue	123 " "	"	o "
Late Orange	216 " "	"	o "
Late Transparent Gage	138 " "	"	o "
Pond's Seedling	162 " "	"	o "
Comte d'Althaus's Gage	349 " "	"	o "
Transparent Gage	403 " "	"	o "
Washington	105 " "	"	o "
SELF-FERTILE—			
Denniston's Superb.	300 " "	"	102 "
Monarch	59 " "	"	14 "
The Czar	284 " "	"	62 "
PARTLY SELF-FERTILE—			
Early Rivers	337 " "	"	25 "
President	489 " "	"	3 "
Prince Engelbert	81 " "	"	6 "
Stint	273 " "	"	4 "

be self-fertile or self-sterile; where the maximum amount of fruit "setting" is desired.

The percentages of fruit setting when crossed represent the result

PERCENTAGE OF FRUIT SETTING, CROSSED AND SELFED.

Denniston's Superb	300 flowers, selfed	set 102 fruits, or 34 per cent.
	128 " crossed	" 51 " " 39.8 "
Monarch . . .	59 flowers, selfed	set 14 fruits, or 23.7 per cent.
	199 " crossed	" 50 " " 25.1 "
The Czar . . .	284 flowers, selfed	set 62 fruits, or 21.8 per cent.
	123 " crossed	" 36 " " 29.2 "
Early Rivers . .	337 flowers, selfed	set 25 fruits, or 7.4 per cent.
	207 " crossed	" 43 " " 20.7 "
President . . .	489 flowers, selfed	set 3 fruits, or 0.6 per cent.
	223 " crossed	" 57 " " 25.5 "
Stint	273 flowers, selfed	set 4 fruits, or 1.4 per cent.
	231 " crossed	" 28 " " 12.1 "
Prince Engelbert .	81 flower, selfed	set 6 fruits, or 7.4 per cent.
	74 " crossed	" 43 " " 58.1 "

of crossing the varieties with the majority of the other seventeen varieties in the experiment.

That pollen from one variety will fertilize a higher percentage of flowers on a certain other variety than will the pollen from another seems possible, but sufficient data has not yet been collected on this point.

The evidence obtained so far goes to show that, with a few exceptions, any one variety will successfully cross-pollinate any other variety, providing that they flower at much about the same time. The exceptions to this are the Coe varieties of plum and Jefferson—

mentioned in the report of the John Innes Horticultural Institute*—the results of some of which we have duplicated. In 1919 20 flowers of President were crossed with Late Orange, and no fruit was set, and again in 1920 106 flowers were pollinated in the same way and no fruit was set, whilst other crosses on the same tree set well. This is probably another case of "cross incompatibility."

These are the only exceptions found so far in plums, and except for these special cases any one variety has been found to fertilize any other that has been tried.

The majority of plums are in flower at much about the same time, so that almost any varieties, with the exceptions just mentioned, may be planted together and successful cross-pollination take place.

The following table shows the eighteen varieties mentioned in this paper in their order of flowering, under orchard conditions at Wisley, for the years 1908-10-11-12-14-17-19-20; and it will be seen from this that the latest is in flower 7 days after the earliest, whilst the average is less than 4 days. It is found that the different varieties are in flower from 14-24 days, and in full bloom on about the eighth day after commencing to flower, so that there is a considerable overlapping period with all.

ORDER OF FLOWERING.†

Grand Duke earliest—no definite records.	4.3	Comte d'Althaus's Gage.
0 Monarch.	4.8	Kirke's Blue.
1.4 Jefferson's.	5	The Czar.
2.5 Denniston's Superb.	5	Pond's Seedling.
2.5 Coe's Golden Drop.	5.5	Transparent Gage.
2.7 President.	5.5	Washington.
3 Early Rivers.	6	Prince Engelbert.
3.5 Decaisne.	6.5	Late Transparent Gage.
4 Late Orange.	7.5	Stint.

As a control to the percentage of fruit setting in the orchard house, trees were chosen outside growing under orchard conditions, and a number of flowers counted and the branches labelled to see the percentage setting under normal conditions; counts were made at two different dates—the first at about six weeks after flowering, and the second five weeks after the first count, with the following results:

Variety.	No. Flowers counted.	1st Count.	2nd Count.
Bittern . . . {	1 branch 612 flowers	153 fruits	47 fruits
	" 234 "	105 "	34 "
Blue Rock . . . {	" 145 "	44 "	24 "
	" 322 "	112 "	49 "
Coe's Golden Drop .	" 300 "	223 "	15 "
Denniston's Superb (1)	" 660 "	178 "	103 "
" " (2)	" 395 "	128 "	61 "
Victoria . . . {	" 250 "	173 "	70 "
	" 142 "	80 "	36 "
Total . . .	3060	1196 39 per cent.	439 14 per cent.

* Sutton, I., in *Journ. of Genetics*, VII. Aug. 1918.

† The figures preceding the name represent the average number of days at which flowering commenced after 'Monarch' began to flower.

Each of the trees—flowers of which were counted in the control experiment—are carrying excellent crops; whilst others equally well flowered have only poor crops, so that the percentage is probably higher than would have been the case had a wider range of varieties been included.

For several reasons it has not yet been found possible to collect sufficient data with regard to the viability of the pollen of the varieties, but an examination was made of pollen from sixteen varieties growing outdoors, in an endeavour to find, with the aid of the microscope, the approximate amount of good and bad grains in average samples.

Of the sixteen varieties examined, the minimum amount of misshapen and apparently bad grains was 8 per cent., this being in pollen from Frogmore Orleans; whilst the maximum amount of bad pollen found was 25 per cent.; in samples from Coe's Golden Drop and Bryanston Gage. The average amount was 17 per cent. misshapen and apparently bad in the other varieties.

ANTIRRHINUMS AT WISLEY, 1920.

TWO HUNDRED AND THIRTY-THREE stocks of Antirrhinums were sent to Wisley for trial in 1920, including one lot of cuttings (No. 233). The seed was sown on March 8 to 11, and as soon as ready the seedlings were pricked out into boxes, this work being completed by the beginning of April. The boxes were kept in cold frames until May 12, when planting out commenced. All but the tall varieties were planted out during that week on well-drained soil which had been dug and lightened by the admixture of burnt refuse and decayed vegetable matter, the tall varieties being planted on May 19 and 20. From twenty-four to thirty plants of each variety were planted in a block, the dwarf or Tom-thumb varieties being one foot apart each way, the intermediate fifteen inches from row to row and zigzagged twelve inches apart in the rows, and the tall eighteen apart each way. All made excellent growth, and by the time they were in flower in mid-July the intermediate varieties had completely covered the ground and they provided for weeks a most attractive mass of blossom. The varieties had been grouped as far as possible in similar shades, which gave an excellent opportunity of comparing the merits of closely related stocks. The trial was examined at intervals by the Judging Committee, who took into consideration not only the beauty of the varieties judged, the quality of the spike and of the individual flower, but also the trueness of the stocks grown. In no case was a stock containing more than a very small percentage of rogues allowed to receive any commendation, and in recommending the higher awards importance was also attached to regularity of height, branching, colour of foliage, and the like, characters which make much difference in the value of these plants for bedding.

Considering the great value of these plants for use in beds, borders, and for cutting, the long period through which, by removing old spikes, the plants may be kept in flower, and the fact that to produce them and grow them well to flower in summer calls for the use of practically no artificial heat, we may expect them to be grown much more in the future than they have been hitherto. Attention may perhaps here be directed also to their use as pot plants in cold green-houses. It is intended to grow, next year, a large number in this way at Wisley, in the hope that others may attempt it as a means of furnishing houses which it is now difficult to heat.

In many cases the stocks sent in for trial were extraordinarily true to type, but in some there appears to be considerable difficulty in securing complete freedom from rogues, especially where the more delicate shades of pink are concerned and where that shade is imposed upon a yellow ground. The various shades

of yellow, too, are often mixed, and while some of the plants may be actual hybrids, and therefore impossible to "fix," it seems probable that much might be done by building up stocks from single isolated plants which have been shown by experiment to breed true: the perennial nature of the plant would be an aid in this.

An interesting example of the effect of consistent selection of one character was seen in certain stocks where all the spikes produced on the plants failed to mature the topmost buds, and therefore ended abruptly in well-developed flowers as large as the lowermost of the spike. The regularity but not the continual flowering of the stock gains thereby, and the latter fact may militate against this form becoming widely popular, but it illustrates remarkably what careful selection may do to a stock.

A few stocks proved either obviously untrue, or so mixed that it was impossible to describe them, and they are therefore omitted from the notes which follow: they were Nos. 51, 69-71, 77, 79, 95, 99, 110, 135, 182, 219, 220, 226. Others, less mixed but still not true, are noted below. For this reason, or because they did not now appear to be equal to others in the trial, the following, which had received awards in previous years and which were represented in the present trial, were passed over, viz.:

23. White Beauty [A.M. 1913 (Dobbie)]; 34. Golden Queen [A.M. 1913 (Bath)]; 96, 98. Nelrose [A.M. 1914 (Wells)]; 41, 43. Amber Queen [A.M. 1913 (Barr, Watkins & Simpson)]; 62. Golden Morn [A.M. 1913 (Watkins & Simpson)]; 122. Sunset [A.M. 1913 (Dickson & Robinson)] 128, 129, 229. Defiance [A.M. 1913 (Bath)]; 172, 173. Yellow King [A.M. 1913 (Barr)]; 175, 176. Moonlight [A.M. 1913 (Dobbie)] 217. Beauty [A.M. 1913 (Barr)].

In the following notes the varieties sent for trial are arranged first according to height and then according to colour, and at the head of each colour-class the varieties in it which were selected for award are printed in black type.

In order to save space no list of varieties in the trial is given, but the number by which each was known until judging was completed is given opposite each variety.

I. DWARF OR TOM THUMB VARIETIES, 6-8 inches high.

1. *Flowers white.*

*5. SNOWFLAKE (Watkins & Simpson).—Spike medium, compact; flowers large, pure white. Raised by sender.

* * *

1. WHITE PRINCE (Barr).—Spike short, very compact; flowers of medium size. Introduced by sender.

2. *Flowers creamy white.*

6. Tom Thumb White, H.C. July 28, 1920, from Messrs. Dobbie.

6. TOM THUMB WHITE (Dobbie), H.C.—Spike long, compact; flowers large, lip pale yellow; height 8 inches.

* The number preceding the name is the "Trial number" by which alone the variety was known at Wisley until judging was completed.

2. ALBUM (Barr).—Similar to foregoing ; a mixed stock.

4. SNOWFLAKE (Simpson).—Spike short, compact ; flowers large, lip cream flushed yellow height 5 inches. Distinct from No. 5.

3. WHITE QUEEN (Barr†).—Similar to No. 4, but with smaller flowers, and taller in growth.

3. *Flowers yellow.*

9. Tom Thumb Yellow, A.M. July 28, 1920, sent by Messrs. Dobbie.

9. TOM THUMB (Dobbie), A.M. July 28, 1920.—Spike long, compact ; flowers large ; height 8-10 inches.

7, 8. YELLOW PRINCE (Barr,† Simpson).—Spike short, compact ; flowers large ; height 8 inches.

4. *Flowers pale pink.*

11. DELICATE PINK (Simpson).—Habit very compact ; spike short, very compact ; flowers of medium size ; height 7 inches ; a shy flowerer. Raised by Messrs. Sutton.

5. *Flowers amber.*

10. AMBER GEM (Simpson).—Habit very compact ; spike short, rather loose ; flowers of medium size, tube creamy white ; height 7 inches ; a shy flowerer.

6. *Flowers mauve.*

12. CARNEUM (Barr†).—A very mixed stock ; flowers cream shaded pale mauve at edges.

13. ROSEUM (Barr†).—Spike short, compact ; flowers pale rosy mauve, of medium size ; height 6-7 inches ; varies in colour.

7. *Flowers orange-scarlet.*

21. FIREFLY (Barr†).—Spike short, rather loose ; flowers of medium size, lower lobe, tipped orange, tube creamy white ; height 8 inches ; varies slightly in shade.

8. *Flowers crimson.*

16. COPPER RED (Barr†).—Spike short, compact ; flowers large, copper red ; height 8 inches.

14. HENRY IV (Barr†).—Similar in habit to No. 16 ; flowers dull crimson ; height 10 inches. A mixed stock.

17. CRIMSON GEM (Simpson).—Spike short, compact ; flowers of medium size, crimson, lip orange ; height 8-10 inches.

18. BRILLIANT CRIMSON (Watkins & Simpson).—Habit similar to No. 17 ; flowers dull velvety crimson ; a true and even stock. Raised by senders.

131. CRIMSON KING (Barr†).—Spike long, very compact ; flowers large, deep velvety crimson ; lip tipped with yellow ; height 8 inches ; contained rogues of Intermediate type.

15. RUBY (Barr†).—Spike short, compact ; flowers large, deep ruby-red ; lip tipped with yellow ; height 10 inches.

† Not listed by the sender.

9. *Flowers magenta. Tube paler.*

19. **GALATHÉE** (Barr†).—Spike short, compact; flowers of medium size; height 6 inches; a true stock.

* * *

20. **DELILAH** (Barr†).—Similar to No. 19, but the lip is tipped with yellow. A mixed stock.

II. INTERMEDIATE VARIETIES; 16 to 24 inches in height.

1. *Flowers white.*

26. **White Queen**, A.M. July 28, 1920 (A.M. 1913, Dobbie), sent by Messrs. Simpson, raised by Messrs. Watkins & Simpson.

24, 25. **Purity**, H.C. August 13, 1920, sent by Messrs. Barr, and by Messrs. Watkins & Simpson the raisers.

24, 25. **PURITY** (Barr, Watkins & Simpson), H.C.—Spike long, rather loose; flowers large, quite white. No. 24, several plants had yellow on the lip.

* * *

22. **QUEEN OF THE NORTH** (Barr).—Spike long, rather loose; flowers large; flower buds when young creamy white; stock not true; foliage irregular. Raised by sender.

* * *

23. **WHITE BEAUTY** (Dobbie).—Foliage a darker green than Nos. 22, 24, 25, Spike long, loose; flowers large; stock not true.

* * *

26. **WHITE QUEEN** (Simpson), A.M.—Habit very compact; spike long, very compact; flowers large, lip yellow tipped.

* * *

27. **WHITE QUEEN** (Burpee).—Habit spreading; spike long, rather loose; flowers large, creamy white.

* * *

28. **IVORINE** (Simpson).—Height 24 to 28 inches; spike long, very compact; flowers large, ivory; contained two rogues. Raised by sender.

2. *Flowers of yellow shades.*

29. **Lady Roberts**, A.M. August 13, 1920, sent by raisers, Messrs. Simpson.

31. **Yellow Queen**, A.M. August 13, 1920, sent by Messrs. Dobbie (A.M. 1913, Dobbie).

36. **Golden Gem**, A.M. August 13, 1920, sent by raisers Messrs. Watkins & Simpson.

35. **Golden Gem**, H.C. July 25, 1920, sent by Messrs. Simpson.

29. **LADY ROBERTS** (Simpson), A.M.—Habit very compact; spike medium, very compact; flowers large, primrose; height 16 inches; very suited for bedding.

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170. **PRIMROSE KING** (Dobbie).—Spike long, compact; flowers very large, primrose, tube creamy-white; height 26 inches.

* * *

30. **CANARY BIRD** (Barr).—A very mixed stock.

* * *

31. **YELLOW QUEEN** (Dobbie), A.M.—Spike long, compact; flowers large, pale yellow.

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33. **YELLOW BEAUTY** (Barr).—Foliage paler, but otherwise like No. 31; irregular in height. Raised by Messrs. Watkins & Simpson.

34. **GOLDEN QUEEN** (Burpee).—Spike long, rather loose; flowers of medium size, pale yellow; stock not true.

* * *

32. **YELLOW QUEEN** (Barr).—Spike long, compact; flowers large, yellow, tube creamy white; height 24 inches; colour variable. Introduced by sender.

221. **GUINEA GOLD** (Webb).—Very similar to No. 32, but with smaller flowers, and not so tall.

36. **GOLDEN GEM** (Watkins & Simpson), **A.M.**—Foliage dull grey green; spike long, compact; flowers very large, yellow, somewhat darker than No. 32, tube paler; height 24 to 26 inches. Raised by senders.

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35. **GOLDEN GEM** (Simpson), **H.C.**—Similar to No. 36, but foliage green, not grey.

37. **GOLDEN GEM** (Barr).—A mixed stock of No. 35.

38. **YELLOW GEM** (Barr).—Similar to No. 35; stock not true.

3. *Flowers pink shades. Tube self.*

80. **Daphne**, **A.M.** July 28, 1920.—Sent by Messrs. Burpee (**A.M.** 1913, Hurst)

87. **Fascination Improved** (Watkins & Simpson), **A.M.** August 13, 1920 Raised by senders.

81. **Rose Queen** (Simpson), **A.M.** July 28, 1920.

75. **Roseum superbum** (Simpson), **H.C.** July 28, 1920.

92, 93, 94. **Rose Doré** (Watkins & Simpson (raisers), Barr), **Queen of Roses** (Barr), **H.C.** July 28, 1920.

90, 91. **PEACE** (Watkins & Simpson, Barr).—Spike of medium length, very compact; flowers large, pale pink; lip tipped with yellow; height 16 to 18 inches. Raised by Messrs. Watkins & Simpson.

* * *

76. **FAIR MAID** (Barr).—Spike long, compact; flowers large, flesh pink; lip cream, flushed pale yellow. Raised by Messrs. Watkins & Simpson.

* * *

80. **DAPHNE** (Burpee), **A.M.**—Spike long, compact; flowers very large, deep flesh pink, lip tipped with yellow.

84, 85. **FASCINATION** (R. Veitch, Dobbie).—Similar to 'Daphne,' but varying somewhat in shade.

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86. **FASCINATION** (Barr).—Similar to No. 80, but of somewhat deeper shade.

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87. **FASCINATION IMPROVED** (Watkins & Simpson), **A.M.**—A true even stock, of a deeper shade of flesh pink than No. 86.

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96, 97, 98. **NELROSE** (Dobbie, R. Veitch, Barr).—Spike long, compact; flowers deep rose-pink, lip tipped with yellow; stocks vary very much in shade.

75. **ROSEUM SUPERBUM** (Simpson), **H.C.**—Similar to foregoing; a true stock.

81. **ROSE QUEEN** (Simpson), **A.M.**—Similar to 'Nelrose'; a true and even stock.

82. **ROSE QUEEN** (Dobbie).—Of slightly paler colour than No. 81; varies slightly in colour.

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92, 93. **ROSE DORÉ** (Watkins & Simpson, Barr), **H.C.**—Habit very compact; spike long, compact; flowers very large, deep rose; lip dull yellow overlaid rose. Raised by Messrs. Watkins & Simpson.

94. **QUEEN OF ROSES** (Barr), **H.C.**—Similar to Rose Doré.

4. *Flowers pink shades. Tube paler.*

152. **Bonny Lass** (Watkins & Simpson), **A.M.** August 13, 1920. Raised by senders.

72. **Wild Rose** (Simpson), **A.M.** July 28, 1920. Raised by Messrs. Watkins & Simpson.

45. **Sunrise** (Simpson), **H.C.** July 28, 1920.

83. **Félicité** (Simpson), **H.C.** July 28, 1920. Raised by sender.

45. **SUNRISE** (Simpson), **H.C.**—Habit very compact; spike long, compact; flowers large, pink faded at the edge, tube white, lip yellow; height 24 to 26 inches.

44. **SUNRISE** (Barr).—A mixed stock of foregoing.

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67. **DAISY IMPROVED** (Watkins & Simpson).—Spike long, compact; flowers large, white tinged pink, tube white, lip pale pink; height 16 inches. Raised by senders.

66. **DAISY** (Barr†).—Similar to foregoing but varies in shade.

68. **DELICATA** (Dobbie).—Habit compact; spike long, rather loose; flowers delicate pink, tube cream, lip tipped with yellow, the upper lobe inclined to fall over the lip; height 16 to 18 inches.

* * *

83. **FÉLICITÉ** (Simpson), **H.C.**—Spike long, compact; flowers large, pale flesh pink, lip pale yellow. Raised by Messrs. Simpson.

* * *

152. **BONNY LASS** (Watkins & Simpson), **A.M.**—Habit very compact; spike long, compact; flowers large, pale rose-pink, tube cream, lip pale yellow.

151. **PINK GEM** (Barr).—Similar to foregoing; stock not true.

* * *

74. **WILD ROSE** (Simpson), **A.M.**—Habit very compact; spike of medium length, rather loose; flowers large, pale rose-pink, tube white, lip yellow; height 16 inches; the first to flower June 10.

73, 74. **WILD ROSE** (Barr, R. Veitch).—Similar to foregoing; but stocks vary in shade of colour, and height.

* * *

89. **PINK GEM** (Watkins & Simpson).—Habit very compact; spike of medium length, very compact; flowers large, rose-pink, tube white, lip pale yellow; height 16 inches; stock not quite true. Raised by senders.

* * *

146. **DIANA** (Barr).—Spike long, compact; flowers large, rose-pink, tube cream, lip tipped with yellow; plants varied in shade.

147. **ATTRACTION** (Barr).—Similar to foregoing. Not true 'Attraction' which is a darker variety.

148. **ROSEBUD** (Barr†).—Similar to No. 146. Raised by Messrs. Watkins & Simpson.

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127. **SPARKLER** (Burpee).—Spike long, compact; flowers of medium size, deep rosy-pink, tube cream; stock not quite true.

* * *

149, 150. **CORAL PINK** (Watkins & Simpson, Barr).—Spike long, compact; flowers large, deep rich rose, tube cream; stocks not true. Raised by Messrs. Watkins & Simpson.

* * *

88. **SUMMER GLORY** (Barr).—Habit compact; spike long, compact; flowers of medium size, bright reddish-pink, tube white, lip tipped with yellow; not quite true.

5. *Flowers pink or red on yellow (shot shades).*

64. **Sybil Eckford**, **A.M.** July 28, 1920. Raised by Messrs. Simpson.

54. **Maize Queen** (Watkins & Simpson), **A.M.** July 28, 1920 (**A.M.** 1913, Dobbie). Raised by senders.

153, 154, 155. **Prima Donna** (Simpson, Dobbie, Watkins & Simpson), **A.M.** July 28, 1920 (**A.M.** 1917, Dobbie). Raised by Messrs. Dobbie.

48. **Morning Glow Improved** (Simpson), **A.M.** August 13, 1920. Raised by sender.

46. **Bonfire** (Simpson), **A.M.** July 28, 1920 (**A.M.** 1913, Simpson, Sydenham). Raised by sender.

52. **Maize Queen Improved** (Simpson), **H.C.** August 13, 1920. Raised by sender.

49. **Captivation** (Watkins & Simpson), **A.M.** July 28, 1920. Raised by senders.

101, 102, 103. **The Fawn** (Simpson, Dobbie, Barr), **H.C.** July 28, 1920. Raised by Messrs. Watkins & Simpson.

64. **SYBIL ECKFORD** (Simpson), **A.M.**—Habit compact; spike long, compact; flowers very large, lemon flushed pale pink, tube cream, lip lemon.

* * *

54. **MAIZE QUEEN** (Watkins & Simpson), **A.M.**—Spike long, rather loose; flowers very large, yellow tinted pink, tube pale salmon buff, lip yellow; height 24 to 26 inches.

55. **MAIZE QUEEN** (Dobbie).—Similar to foregoing but slightly paler; stock not quite true.

52. MAIZE QUEEN IMPROVED (Simpson), **H.C.**—Characters as for No. 54 except habit very compact; flowers maize yellow tinted salmon; height 16 to 18 inches.

53. MAIZE QUEEN IMPROVED (Barr).—Similar to foregoing; varies very much in shade of colour.

* * *

49. CAPTIVATION (Watkins & Simpson), **H.C.**—Spike long, very compact; flowers very large, chamois shaded pink, lip pale yellow.

50. CAPTIVATION (Barr).—Similar to foregoing; stock not true.

* * *

39. APRICOT QUEEN (Barr†).—Spike long, rather loose; flowers large, upper lobe apricot-pink, lower apricot-pink with pale yellow centre, tube white, lip yellow; varies slightly in shade of colour.

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101, 102, 103. THE FAWN (Simpson, Dobbie, Barr), **H.C.**—Spike long, very compact; flowers very large, pale pinkish terra-cotta, tube cream, lip pale citron. In Nos. 102, 103, the terminal flowers of the spike did not develop.

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153, 154, 155. PRIMA DONNA (Simpson, Dobbie, Watkins & Simpson), **A.M.**—Spike long, compact; flowers large, pink shaded terra-cotta, tube cream, lip pale yellow.

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158. ORANGE PRINCE SELECTED (Barr) } Spike of medium length, compact;
227. ORANGE PRINCE (Webb) }

flowers large, upper lobe orange-pink, lower old gold shaded pink, tube cream, lip old gold.

40, 224. PRINCE CHAMOIS (Burpee, Webb†).—Characters as foregoing.

* * *

41, 42, 43. AMBER QUEEN (Barr, Simpson, Dobbie).—Spike of medium length, compact; flowers of medium size, amber, tube white. Raised by Messrs. Watkins & Simpson.

* * *

222. ROSE QUEEN (Webb).—Spike long, rather loose; flowers large, old gold shaded pink, tube deep rose-pink, lip old gold; varies in shade of colour.

* * *

111. ORANGE QUEEN (Barr).—Spike long, very compact; flowers very large, terra-cotta shaded old gold, tube deep rose-pink, lip old gold; varies slightly in shade. Raised by Messrs. Watkins & Simpson.

* * *

48. MORNING GLOW IMPROVED (Simpson), **A.M.**—Habit very compact; spike long, compact; flowers large, deep apricot shaded terra-cotta, tube orange-buff.

* * *

114. SUNBEAM (Barr).—Spike long, compact; flowers large, terra-cotta shaded orange, tube rosy-pink, lip old gold; height 18 inches. Raised by Messrs. Watkins & Simpson.

* * *

46. BONFIRE (Simpson), **A.M.**—Habit very compact; spike long, compact; flowers large, apricot shaded old gold, tube orange-buff, lip old gold.

47. BONFIRE (Dobbie).—Characters as foregoing; stock not true.

* * *

100, 112. MORNING GLOW (Watkins & Simpson, Barr).—Habit very compact; spike long, compact; flowers large, terra-cotta on orange, tube dull orange-scarlet, lip dull orange; stocks not quite true. Raised by Messrs. Watkins & Simpson.

* * *

62. GOLDEN MORN (Dobbie).—Spike long, compact; flowers large, gold shaded deep rose, tube deep pink, lip old gold.

6. *Flowers orange. Tube white.*

57. *Electra* (Watkins & Simpson), **H.C.** July 28, 1920. Raised by senders.

57. ELECTRA (Watkins & Simpson), **H.C.**—Habit very compact; spike long, compact; flowers of medium size, brilliant orange, tube white, lip maize yellow.

56, 58, 59. **ELECTRA** (Barr, Simpson, R. Veitch).—Characters as foregoing ; stocks not true.

78. **BLUSH BEAUTY** (Barr).—Proved to be 'Electra.'

7. *Flowers orange-scarlet. Tube self.*

123. **Rembrandt** (Simpson), A.M. August 13, 1920.

118. **Spitfire** (Simpson), A.M. July 28, 1920. Raised by Messrs. Watkins & Simpson.

113, 232. **ADMIRATION** (R. Veitch, Barr†).—Spike long, compact ; flowers large, upper lobe scarlet shaded orange, lower with yellow in centre, tube white, lip scarlet shaded orange ; height 18 inches, stock not quite true.

161, 162. **GRENADIER** (Barr, Watkins & Simpson).—Characters as foregoing. Raised by Messrs. Watkins & Simpson.

123. **REMBRANDT** (Simpson), A.M.—Character as for 'Admiration,' but of very compact habit, and a true and even stock, with rather more yellow on the lower lobe than 'Admiration.'

* * *

122. **SUNSET** (Barr).—Spike long, compact ; flowers large, orange-scarlet shaded rose, lip orange ; stock not quite true. Introduced by sender.

118. **SPITFIRE** (Simpson), A.M.—Habit very compact ; spike long, compact ; flowers large, orange-scarlet, tube dull orange pink, lip dull orange.

119, 120. **SPITFIRE** (Barr, R. Veitch).—Characters as foregoing. Stocks vary in shade of colour.

* * *

128, 129, 229. **DEFIANCE** (Barr, Burpee, Webb).—Spike long, compact ; flowers large, orange-scarlet, lip orange ; stocks not true.

8. *Flowers orange-scarlet. Tube paler.*

160. **SENSATION** (Barr).—Spike long, compact ; flowers large, orange-scarlet shaded pink, tube cream, lip tipped with yellow. Raised by Messrs. Watkins & Simpson.

* * *

124. **FLAMINGO** (Barr).—Characters as foregoing, but flowers orange-scarlet shaded gold, lip orange. Raised by Messrs. Watkins & Simpson.

* * *

163, 228. **FIERY BELT** (Dobbie, Webb†).—Spike long, compact ; flowers large, bright orange-scarlet, tube cream ; varies in shade.

* * *

159. **AURORA** (Barr).—Spike long, rather loose ; flowers large, fiery orange-scarlet ; tube cream ; stock not true.

9. *Flowers scarlet.*

121. **Afterglow** (Simpson), A.M. August 13, 1920. } Two selections similar to

136. **Plymouthia** (Andrews), A.M. August 13, 1920. } 'Flame.'

202. **Cardinal** (Simpson), A.M. August 13, 1920.—Introduced by sender.

116. **FIREFLAME** (Barr).—Spike long, compact ; flowers large, pale scarlet, lip dull orange ; stock not true.

* * *

115. **SCARLET AND GOLD** (Dobbie).—Characters as for No. 116, but flowers scarlet, lip gold ; a mixed stock.

* * *

134. **FLAME** (Watkins & Simpson).—Characters as for 'Afterglow.' Stock not true. Raised by Messrs. Bath.

121. **AFTERGLOW** (Simpson), A.M.—Habit very compact ; foliage dark green ; spike long, compact ; flowers large, bright scarlet. Raised by sender.

136. **PLYMOUTHIA** (Andrews), A.M.—Characters as foregoing, but foliage paler. Raised by sender.

117. **FURNACE** (Engleheart).—Characters as for 'Afterglow' ; a mixed stock. Introduced by sender.

126. **COCCINEUM** (Dobbie).—Characters as foregoing ; stock not quite true.

230. **VERMILION** (Webb†).—Characters as foregoing ; stock not quite true.

* * *

202. **CARDINAL** (Simpson), A.M.—Habit compact ; spike long, rather loose ; flowers very large, scarlet, tube reddish-purple, lip tipped with orange.

10. *Flowers crimson.*

130. **Crimson King** (Simpson), **A.M.** August 13, 1920. Raised by Messrs. Watkins & Simpson.

132. **Crimson Queen** (Dobbie), **H.C.** July 28, 1920.

140. **SCARLET KING** (Barr).—Spike long, compact; flowers of medium size, bright crimson scarlet.

* * *

132. **CRIMSON QUEEN** (Dobbie), **H.C.**—Foliage of medium green, much tinged with red; spike long, compact; flowers large, bright velvety crimson.

133. **CRIMSON QUEEN** (Barr).—Characters as foregoing; stock not true. Introduced by sender.

* * *

130. **CRIMSON KING** (Simpson), **A.M.**—Habit very compact; spike long, compact; flowers large, deep velvety crimson; an even stock.

125. **FIRE BRAND** (Burpee).—Characters as foregoing; but not so compact in habit nor spike as long.

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233. **W. G. HALE** (Sowman).—Foliage dark dull green, much tinged with red; spike long, compact; flowers large, deep dull velvety crimson. Raised by sender. A very even stock grown from cuttings.

11. *Flowers crimson-maroon.*

223. **SCEPTRE** (Webb).—Habit, inclined to spread; foliage dark dull green, somewhat tinged with red; spike long, loose; flowers of medium size, deep velvety crimson-maroon.

* * *

141, 142. **BLACK PRINCE** (Barr, Simpson).—Habit compact; foliage of medium green, somewhat tinged with red; spike of medium length, compact; flowers large, deep velvety maroon. No. 142 not quite true.

143. **BLACK PRINCE IMPROVED** (Watkins & Simpson).—Characters as foregoing; stock not true; contained rogues of paler shade. Raised by senders.

12. *Flowers carmine.*

139. **Carmine Queen Improved** (Watkins & Simpson), **A.M.** August 13, 1920. Raised by senders.

137. **Carmine Queen** (Simpson), **H.C.** July 28, 1920 (**A.M.** 1913, Watkins & Simpson). Raised by Messrs. Watkins & Simpson.

137. **CARMINE QUEEN** (Simpson), **H.C.**—Spike long, compact; flower very large, carmine, lip orange.

138. **CARMINE QUEEN** (Dobbie).—Characters as foregoing; stock not quite true.

* * *

139. **CARMINE QUEEN IMPROVED** (Watkins & Simpson), **A.M.**—Characters as No. 137, but flowers and lip deep rose carmine.

* * *

209. **BRILLIANT** (Dobbie).—Height 2 feet; spike of medium length, compact; flowers large, carmine, lip orange on carmine; varies in shade and height.

13. *Flowers mauve or mauve and white. Tube self.*

108, 109. **SILVER QUEEN** (Watkins & Simpson, Barr).—Spike long, rather loose; flower very large, pale silvery mauve, lip cream tipped with yellow; stocks quite not true. Raised by Messrs. Watkins & Simpson.

* * *

104, 106. **MAUVE BEAUTY** (Barr, R. Veitch).—Spike long, compact; flowers large, rosy-mauve, lip cream tipped with yellow; contained rogues. Raised by Messrs. Watkins & Simpson.

105. **MAUVE BEAUTY IMPROVED** (Watkins & Simpson).—Characters as foregoing, but spike more compact. Raised by senders.

107, 225. **MAUVE QUEEN** (Dobbie, Webb†).—Characters as for 'Mauve Beauty.' Stocks not true.

† Not listed by the sender.

14. *Flowers mauve or mauve and white. Tube white.*156. **ELEGANCE** (Barr), H.C. July, 1920. Raised by Messrs. Hurst.156. **ELEGANCE** (Barr), H.C.—Spike short, compact; flowers large, rosy-mauve, upper lobe rosy-mauve veined darker, tube white, lip cream tipped with yellow.157. **ELEGANCE** (Simpson).—Characters as foregoing; a mixed stock.15. *Flowers parti-coloured.*145. **MAGPIE** (Barr).—Spike long, rather loose; flowers of medium size; upper lobe white, upper half flushed rose-purple, lower lobe white, lip rose-purple, tube white; varies very much in colour. Raised by Messrs. Watkins & Simpson.63. **QUAKER MAID** (Barr).—Characters as foregoing.65. **NOBILE** (Dobbie).—A mixed stock of 'Magpie.'

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144. **BUTTERFLY** (Barr).—Spike long, rather loose; flowers of medium size, pale yellow, upper half of upper lobe flushed reddish-maroon, lip reddish-maroon, tube cream; stock not true. Raised by Messrs. Watkins & Simpson.61. **BRONZE QUEEN** (Dobbie).—A mixed stock of foregoing.60. **BRONZE KING** (Barr).—A mixed stock of 'Butterfly.'III. TALL VARIETIES, $2\frac{1}{2}$ to $3\frac{1}{2}$ feet.1. *Flowers white.*167. **Queen Victoria** (Barr), C. August 13, 1920 (A.M. 1913, J. Veitch).165. **WHITE KING** (Dobbie).—Spike long, rather loose; height $2\frac{1}{2}$ feet; flowers very large, lip tipped with yellow; contained rogues.

* * *

164. **SNOWFLAKE** (Barr).—Spike long, rather loose, height $3\frac{1}{2}$ feet; flowers of medium size; habit inclined to spread; stock not true. Introduced by sender.

* * *

167. **QUEEN VICTORIA** (Barr), C.—Spike long, compact; height $3\frac{1}{2}$ feet; flowers very large, dull white, lip cream, tipped with lemon.166. **QUEEN VICTORIA** (Simpson).—Characters as foregoing, but spike not as long and loose.2. *Flowers yellow.*174. **Yellow King Improved** (Watkins & Simpson), A.M. August 13, 1920. Raised by senders.171. **GOLDEN BEAUTY** (Simpson).—Spike long, compact; flowers very large, pale yellow, tube cream.

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174. **YELLOW KING IMPROVED** (Watkins & Simpson), A.M.—Plant compact; spike long; flowers close, very large, deep yellow.

* * *

172, 173. **YELLOW KING** (Barr, Dobbie).—Habit and spike looser than No. 174, otherwise similar. Raised by Messrs. Barr.14. *Flowers lilac.*169. **LILAC QUEEN** (Barr†).—Height $2\frac{1}{2}$ feet; spike long, rather loose; flowers large, white shaded pale lilac, lip lemon, tube cream; varies slightly in shade. Raised by Messrs. Hurst.3. *Flowers pink shades. Tube self.*177. **Princess Patricia** (Barr), H.C. August 13, 1920. Raised by Messrs. Hurst.183, 184, 185. **Feltham Beauty** (Simpson, Watkins & Simpson, Barr), H.C. August 13, 1920. Raised by Messrs. Watkins & Simpson.

† Not listed by the sender.

177. PRINCESS PATRICIA (Barr), H.C.—Spike of medium length, compact; flowers very large, deep pink, lip paler; the terminal buds do not develop.

183, 184, 185. FELTHAM BEAUTY (Simpson, Watkins & Simpson, Barr), H.C.—Plant compact; spike long, rather loose; flowers very large, rose-pink, lip cream flushed rose-pink.

189. REINE DES ROSES (Barr).—Spike long, rather loose; flowers large, rose, lip tipped with yellow; varies somewhat in shade. Introduced by sender.

190. LE RÊVE (Barr).—Very similar to foregoing, but darker shade of rose; irregular in height; stock not true. Introduced by sender.

4. Flowers pink shades. Tube paler.

181. Cerise King (Watkins & Simpson), A.M. August 13, 1920, and No. 191. Cerise King (Barr), H.C. August 13, 1920. Raised by Messrs. Watkins & Simpson.

179. Esmé (Simpson), H.C. August 13, 1920. Raised by sender.

186. Cottage Maid (Dobbie), H.C. August 13, 1920 (A.M. 1913, Dobbie). Raised by Messrs. Watkins & Simpson.

168. PINK PEARL (Barr).—Plant somewhat spreading; spike long, rather loose; flowers large, cream shaded peach, lip cream shaded reddish-pink, tube cream; stock not true.

178. VENUS IMPROVED (Watkins & Simpson).—Plant compact; spike long, rather loose; flowers large, delicate pink, lip cream tipped with yellow, tube white. Raised by senders.

180. ARIEL (Barr).—Very similar to foregoing; but darker, and lip cream flushed pink. Introduced by senders.

179. ESMÉ (Simpson), H.C.—Characters as for 'Ariel'; but darker and centre of lower lobe paler pink.

181. CERISE KING (Watkins & Simpson), A.M.—Plant compact; spike long, very compact; flowers large, upper lobe cerise-pink, lower with white centre, lip tipped with yellow, tube white.

191. CERISE KING (Barr), H.C.—Similar to foregoing, but varies slightly in shade.

186. COTTAGE MAID (Dobbie), H.C.—Spike long, rather loose; flowers large, pale rose-pink, lip tipped with yellow; tube white.

192. EXONIA (R. Veitch).—Very similar to foregoing, but flowers of a deeper shade, and spike more compact; stock not true. Raised by sender.

188. ROSE PINK (Simpson).—Plant compact; spike long, rather loose; flowers of medium size, rose-pink, lip tipped with yellow, tube white. A selection from 'Salmon Pink.'

187. CORAL ROSE (Barr).—Characters as foregoing, but foliage medium green, somewhat tinged with brown.

5. Flowers terra-cotta and shot shades.

175, 176. MOONLIGHT (Dobbie, Barr†).—Described in vol. 39, p. 641. Stocks vary in shade of colour.

231. SCARLET QUEEN (Webb).—Height 2½ feet; spike long, rather loose; flowers large, apricot flushed terra-cotta, lip orange; varies in shade.

† Not listed by the sender.

6. *Flowers orange.*

193. FAIRY (Simpson).—Spike long, compact; flowers large, orange overlaid pink, lip old gold shaded orange, tube white; stock not true. Raised by sender.

* * *

194, 195. TORCHLIGHT (Barr,† Watkins & Simpson).—Height 3½ feet; spike long, compact; flowers large, deep orange, lip deep yellow, tube white; varies very much in shade. Raised by Messrs. Watkins & Simpson.

7. *Flowers orange-scarlet. Tube self.*

200. DEFIANCE (Barr).—Spike long, compact; flowers large, orange-scarlet, tube reddish-purple, lip tipped with yellow; stock not true.

* * *

199. GLOW (Barr).—Plant somewhat spreading; spike long, compact; flowers of medium size, orange-scarlet, lip orange overlaid scarlet, tube paler; not true stock.

* * *

201. ORANGE KING (Barr).—Characters as foregoing; but looser spike and larger flowers, tube reddish-purple; varies in shade. A selection of 'Sunset.'

* * *

196. BEACON (Simpson).—Plant compact; spike long, compact; flowers of medium size; scarlet overlaid orange, tube pale reddish-purple, lip old gold; varies in shade.

8. *Flowers orange-scarlet. Tube white.*

197. The King (Simpson), H.C. August 13, 1920. Raised by sender.

197. THE KING (Simpson), H.C.—Spike long, very loose; flowers large, pale orange-scarlet, lip scarlet, tube white.

* * *

198. FIRE KING (Barr).—Very similar to foregoing, but generally a darker shade of orange-scarlet, lip orange overlaid scarlet.

9. *Flowers carmine. Tube self.*

213. CARMINEA (Simpson).—Spike long, compact; flowers large, carmine, lip tipped with yellow.

10. *Flowers carmine. Tube white.*

212. ROSE PEARL (Barr).—Spike long, compact; flowers large, pale rose carmine with white centre on lower lobe, lip cream tipped with yellow; varies slightly in shade. Raised by Messrs. Watkins & Simpson.

* * *

214. CARMINE KING (Simpson).—Spike long, compact; flowers large, bright carmine.

11. *Flowers crimson. Tube self.*

203. RUBY (Watkins & Simpson).—Foliage medium green, somewhat tinged brown; spike long, rather loose; flowers large, bright ruby, lip tipped with yellow. Raised by senders.

* * *

206, 207. CRIMSON KING (Barr, Dobbie).—Foliage medium green, tinged dark red; spike long, compact; flowers large, rich velvety crimson; stocks not true. Raised by Messrs. Watkins & Simpson.

204. GRANDIFLORUM CRIMSON (Simpson).—Characters as foregoing; stock not true. Introduced by Messrs. Hurst.

* * *

215. VULCAN (Barr).—Resembles 'Crimson King,' but of a darker shade, and foliage less tinged. Introduced by sender.

216. MONARCH (Barr).—Similar to foregoing. Raised by Messrs. Hurst.

217. BEAUTY (Barr).—Characters as for 'Vulcan'; stock not true. Introduced by sender.

† Not listed by the sender.

210. WARRIOR (Simpson).—Height $2\frac{1}{2}$ feet; spike long, compact; flowers very large, very deep velvety crimson; stock not true. A selection from 'Cardinal.'

12. *Flowers crimson. Tube pale.*

205. INDIAN PRINCE (Simpson).—Foliage medium green; spike long, rather loose; flowers large, deep velvety crimson, tube cream; in flower October 3. Raised by sender.

* * *

208. BRILLIANT (Barr).—Very similar to foregoing, but foliage tinged dark red, and flowers smaller. Introduced by sender.

13. *Flowers magenta.*

211. GALATEA (Barr).—Spike long, rather loose; flowers large, pale magenta, lip yellow at margin and tube white; varies slightly in shade.

15. *Flowers striped.*

218. SELECTED STRIPED (Dobbie).—Described in vol. xxxix. p. 642.

PERENNIAL ASTERS (MICHAELMAS DAISIES)
AT WISLEY, 1920.

ONE hundred and sixty-eight stocks of perennial Asters were received for trial at Wisley in the autumn of 1919. They were planted on deeply dug ground, which had been manured, in groups of three of a variety. The plants were two feet apart and six feet separated one group from the next.

Some stocks failed, or were wrongly named, and are not further referred to below, namely, Nos. 4, 38, 39, 66, 104, 124, 126, 128, 142, 153, 155. The remainder made good growth, and during September and October proved a most attractive feature of the garden and aroused a great deal of interest among visitors.

Perhaps in no group of hardy perennials has so great a number of very good garden plants been raised during the last thirty years, and it is interesting to compare the lists of those grown in 1902 (R.H.S. JOUR., vol. xxvii. p. 638) and 1907 (R.H.S. JOUR., vol. xxxiii. p. 184), when the change will at once become apparent.

The following, represented in the present trial, have had awards in previous years, but were not judged of sufficient excellence to figure with those recommended for awards by the Judging Committee which inspected the trials on various occasions.

115. Ophir [A.M. 1902 (V. Gibbs)]; 66. Hilda Morris [A.M. 1907 (Jones)]; 108. Maidenhead [A.M. 1908 (Gibbs)]; 85, 86. Peggy Ballard [A.M. 1910 (Ballard)]; 41. St. Egwyn [A.M. 1907 (Pollard)]; 11. White Queen [A.M. 1907 (Barr)]; 89. Cloudy Blue [A.M. 1914 (Ballard)]; 84. King Albert [A.M. 1915 (Ballard)]; 96, 97. Joan Vaughan [A.M. 1917 (Baker)]; 99. Rose Queen [A.M. 1919 (Baker)].

In the descriptive notes which follow we have grouped the varieties first, according to height, then in each height-group, according to colour, and whether single or semi-double. The order under each colour-heading is to start with the lighter shades of the colour and progress step by step to the darker. In the notes on the individual varieties the time of flowering is indicated, and in brackets after each description the name of the "type" to which it may be assigned is given, as a guide to the habit of the plant. The *Novi-Belgii* and *Novae-Angliae* forms are of erect growth and floriferous habit; the *ericoides*, *vimineus*, and *diffusus* forms are of bushy growth and bear numerous small flowers along the arching shoots; the *amellus* group are dwarf, large-leaved, and bear few but large and showy flowers. The others noted are well-known species.

One of the drawbacks of many perennial Asters is their proneness to running from the base so that they tend quickly to monopolize a large space. This was much more noticeable in the old than in the

newer forms, and where this objectionable habit was marked we have noted it in the descriptions.

At the head of each group we have put in thick type the names of the varieties belonging to it to which awards were made as a result of the present trial. The numbers prefixed to the varieties are those by which alone the plant was known until judging was completed.

DESCRIPTIVE NOTES.

I. HEIGHT 4 FEET TO 6 FEET (pp. 376, 380).

1. *Flowers white, single.*

18. **Maid of Colwall, A.M.** September 23, 1920. Raised by Mr. Ballard.

III. **Golden Fleece, H.C.** October 8, 1920. Raised by Messrs. Jones.

18. MAID OF COLWALL (Ballard), **A.M.**—Height $5\frac{1}{2}$ feet; flowers 2 inches diameter, pure white, do not stain when old; flowering from September 18 to October 18; useful for cutting; not yet in commerce. (*Novi-Belgii.*)

* * *

13. **WELLS' WHITE** (Ruys).—Height $4\frac{1}{2}$ feet; flowers $1\frac{1}{2}$ inches diameter; flowering from September 14 to October 11; useful for cutting. (*Novi-Belgii.*)

168. **UNNAMED** (Ruys).—Indistinguishable from foregoing; running rather badly. (*Novi-Belgii.*)

* * *

163. **SEEDLING No. 2** (Simpson).—Height $5\frac{1}{2}$ feet; flowers $\frac{3}{4}$ inch diameter; in flower October 7 to October 29; a very showy plant; useful for cutting. (*diffusus.*)

* * *

162. **SEEDLING No. 28** (Simpson).—Height 4 feet; flowers $\frac{3}{4}$ inch diameter; in flower September 10 to October 14; running rather badly; similar to 'Coombe Fishacre White.' (*diffusus.*)

* * *

16. **AVALANCHE** (Baker).—Height 4 feet; flowers $1\frac{1}{2}$ inches diameter; in flower September 16 to October 16. Raised by Mr. E. Beckett. (*Novi-Belgii.*)

* * *

17. **WHITE CLIMAX** (Jones).—Height 5 feet; flowers white, fading to cream, $1\frac{1}{2}$ inches diameter, disc too prominent; flowering from September 20 to October 18. Raised by sender. (*Novi-Belgii.*)

* * *

II. **WHITE QUEEN** (Ruys).—Height $4\frac{1}{2}$ feet; flowers white, when old stained pale blue, $1\frac{1}{4}$ inches diameter; in flower September 14 to October 11; inclined to run. (*Novi-Belgii.*)

* * *

109. **JOAN** (Jones).—Height $4\frac{1}{2}$ feet; flowers $\frac{5}{8}$ inch diameter; disc passing from yellow to rose; in flower September 30 to October 29. Raised by sender. (*ericoides.*)

* * *

III. **GOLDEN FLEECE** (Jones), **H.C.**—Height 4 feet; flowers $\frac{1}{2}$ inch diameter; disc very prominent, giving the flowers a creamy tinge; in flower October 3 to October 30. (*ericoides.*)

* * *

134. **DATSCHI** (Ruys).—Height 4 feet; flowers $\frac{3}{8}$ to $\frac{1}{2}$ inch diameter; in flower October 23 to November 5; running very badly. (*diffusus.*)

* * *

106. **EDIE** (Jones).—Height $4\frac{1}{2}$ feet; flowers creamy-white, $\frac{3}{4}$ inch diameter; in flower October 1 to October 27; useful for cutting. Raised by sender. (*ericoides.*)

2. *Flowers of pink shades.*a. *Single.*

3. **RYECROFT PINK**, A.M. September 23, 1920. Raised by Messrs. Jones.
 1, 2, 4. **LIL FARDELL**, A.M. September 23, 1920. Raised by Messrs. Jones [A.M. 1907 (Jones)].
40. **MONS**, A.M. September 23, 1920. Raised by Mr. E. Beckett [A.M. 1919 (Wells)].
166. **RIIBSTON**, A.M. September 23, 1920. Raised by Mr. Simpson.
 165. **MISS WOODALL**, H.C. September 23, 1920. Raised by Mr. Simpson.
 26. **HILDA**, H.C. October 8, 1920. Raised by Messrs. Jones.
 27. **MRS. TWINAM**, H.C. September 23, 1920. Raised by Messrs. Jones.
 22. **ETHEL BALLARD**, H.C. September 23, 1920. Raised by Mr. Ballard.
26. **HILDA** (Jones), H.C.—Height $4\frac{1}{2}$ feet; flowers $1\frac{1}{2}$ inches diameter, soft pink; in flower September 28 to October 16; useful for cutting. (*Novi-Belgii*)
- * * *
27. **MRS. TWINAM** (Jones), H.C.—Height 4 feet; flowers $1\frac{1}{4}$ inches diameter, soft pink; flowering from September 16 to October 18; useful for cutting. (*Novi-Belgii*)
- * * *
22. **ETHEL BALLARD** (Ballard), H.C.—Height $4\frac{1}{2}$ feet; flowers mostly single, shell pink, 2 inches diameter, somewhat ragged in appearance; flowering from September 22 to October 18; useful for cutting. (*Novi-Belgii*)
31. **MRS. HUSON MORRIS** (Jones).—Proved to be 'Ethel Ballard.'
- * * *
25. **GHEENT** (Jones).—Height 4 feet; flowers pale pink, $1\frac{1}{4}$ inches diameter; in flower September 10 to October 14. Raised by Mr. E. Beckett, introduced by sender. (*Novi-Belgii*)
- * * *
3. **RYECROFT PINK** (Ruys), A.M.—Height $5\frac{1}{2}$ feet; flowers pale pink, $1\frac{3}{4}$ to 2 inches diameter; disc golden; in flower September 8 to October 19. (*Novae-Angliae*)
- * * *
160. **ROSE McDONALD** (Jones).—Height $4\frac{1}{2}$ feet; flowers $1\frac{1}{4}$ inches diameter, pale pink; disc deep yellow; flowering from September 30 to October 27. Raised by sender. (*Novi-Belgii*)
- * * *
140. **MRS. PERRY IMPROVED** (Ruys).—Height 4 feet; flowers $1\frac{1}{2}$ inches diameter, pale pink; disc pale yellow; in flower August 30 to October 10; growth rather dense. (*Novi-Belgii*)
- * * *
30. **ROSY MORN** (Ballard).—Height $4\frac{1}{2}$ feet; flowers pink, $1\frac{1}{2}$ inches diameter; in flower September 18 to October 20; dense in growth. Raised by sender. (*Novi-Belgii*)
- * * *
32. **RAGTIME** (Ballard).—Height 4 feet; flowers $1\frac{1}{4}$ inches diameter, pink; in flower September 22 to October 18; growth rather dense. Raised by sender. (*Novi-Belgii*)
- * * *
- 1, 2, 4. **LIL FARDELL** (Jones, Ruys, Jones), A.M.—Height 6 feet; flowers $2\frac{1}{4}$ inches diameter, rich clear pink; disc golden; in flower September 18 to October 19. (*Novae-Angliae*)
- * * *
33. **MARNE** (Jones).—Height 4 feet; flowers bright deep pink, $1\frac{1}{2}$ inches diameter; disc golden; in flower September 18 to October 14. Raised by Mr. E. Beckett, and introduced by sender. (*Novi-Belgii*)
- * * *
165. **MISS WOODALL** (Simpson), H.C.—Height 4 feet; flowers rose pink, $1\frac{3}{8}$ inches diameter; flowering from September 28 to October 16; growth inclined to be dense. (*Novi-Belgii*)
- * * *
40. **MONS** (Wells), A.M.—Height 4 feet; flowers bright rose-pink, $1\frac{1}{2}$ inches diameter; flowering from September 22 to October 27; flower buds very attractive; useful for cutting. (*Novi-Belgii*)

166. RIBSTON (Simpson), A.M.—Height $4\frac{1}{2}$ feet; flowers mostly single, deep rose, $1\frac{1}{8}$ inches diameter; flowering from September 26 to October 18; growth rather dense. (*Novi-Belgii*.)

b. Semi-Double.

79. Heather Glow, A.M. September 23, 1920. Raised by Mr. Ballard.

37. Antwerp, A.M. September 23, 1920. Raised by Mr. Edwin Beckett.

79. HEATHER GLOW (Ballard), A.M.—Height 5 feet; flowers rose-pink, $1\frac{3}{4}$ inches diameter; in flower September 18 to October 20; a very effective variety; inclined to run. (*Novi-Belgii*.)

* * *

37. ANTWERP (Wells), A.M.—Height $4\frac{1}{4}$ feet; flowers rose-pink, $1\frac{1}{2}$ inches diameter; in flower September 22 to October 17; useful for cutting. (*Novi-Belgii*.)

* * *

99. ROSE QUEEN (Baker).—Height 4 feet; flowers deep rose-tinged carmine, 2 inches diameter; in flower September 6 to October 12; useful for cutting. Introduced by sender. (*Novi-Belgii*.)

3. Flowers, pinkish mauve.

a. Single.

9. Mrs. Wheeler Bennett, A.M. September 23, 1920. Sent by Messrs. Jones.

35. Ada, C. October 8, 1920. Raised by sender.

50. Mrs. J. F. GREEN (Jones).—Height $4\frac{1}{2}$ feet; flowers soft pinkish-mauve, $1\frac{1}{4}$ inches diameter; in flower October 6 to October 22. Raised by sender. (*Novi-Belgii*.)

* * *

49. MOONSTONE (Jones).—Height $4\frac{1}{2}$ feet; flowers pale pinkish-mauve, $1\frac{1}{2}$ inches diameter; in flower September 28 to October 21. Raised by sender. (*Novi-Belgii*.)

* * *

9. MRS. WHEELER BENNETT (Jones), A.M.—Height $4\frac{1}{2}$ feet; flowers pinkish-mauve, $1\frac{1}{2}$ inches diameter; in flower September 18 to October 21. (*Novi-Belgii*.)

* * *

35. ADA (Jones), C.—Height $4\frac{1}{2}$ feet; flowers $1\frac{3}{4}$ to 2 inches diameter, rich pinkish-mauve; flowering from September 30 to October 20; useful for cutting. (*Novi-Belgii*.)

* * *

48. CAPTAIN FRYATT (Jones).—Height 4 feet; flowers $1\frac{3}{4}$ inches diameter, pale rosy-mauve; in flower September 20 to October 21; very suitable for cutting. Raised by Mr. E. Beckett, and introduced by sender. (*Novi-Belgii*.)

* * *

34. GENERAL LEMAN (Jones).—Height 6 feet; flowers deep pink tinged pale lavender, $1\frac{1}{4}$ inches diameter; flowering from September 18 to October 18. Raised by Mr. E. Beckett, and introduced by sender. (*Novi-Belgii*.)

b. Semi-Double.

43. PERRY'S PINK IMPROVED (Ruys).—Height $5\frac{1}{2}$ feet; flowers pink tinged lavender, $1\frac{1}{4}$ inches diameter; flowering from September 16 to October 10. (*Novi-Belgii*.)

4. Flowers bluish-mauve.

a. Single.

62, 75. Anita Ballard, A.M. September 23, 1920. Raised by Mr. Ballard.

46. Bruges, A.M. October 8, 1920. Raised by Mr. Edwin Beckett.

10. puniceus pulcherrimus, H.C. September 23, 1920.

88. Robinson V.C., H.C. September 23, 1920. Raised by Mr. Edwin Beckett [A.M. 1918 (Wells)].

47. Edith Mills, H.C. October 8, 1920. Raised by Messrs. Jones.

52. Brussels, H.C. September 23, 1920. Raised by Mr. Edwin Beckett.

76. Cleopatra, H.C. October 8, 1920. Raised by Mr. Ballard.

10. **PUNICEUS PULCHERRIMUS** (Ruys), **H.C.**—Height 5 feet; flowers pale bluish-white, $1\frac{3}{4}$ inches diameter; in flower September 18 to October 19; useful for cutting. (*Puniceus*.)

20. **LILY WELLS** (Jones).—Height $4\frac{1}{2}$ feet; flowers pale pinkish-blue, $1\frac{1}{2}$ inches diameter; in flower September 22 to October 18; growth very dense. Raised by sender. (*Novi-Belgii*.)

21. **BLUSH QUEEN** (Jones).—Very similar to No. 20, but flowers irregular in shape. Raised by sender. (*Novi-Belgii*.)

47. **EDITH MILLS** (Jones), **H.C.**—Height 5 feet; flowers pale silvery mauve, 2 inches diameter; flowering from September 22 to October 22. (*Novi-Belgii*.)

45. **GLADYS DONNELLAN** (Jones).—Height 6 feet; flowers pale lavender, $1\frac{3}{4}$ to 2 inches diameter; in flower September 26 to October 31; useful for cutting. Raised by sender. (*Novi-Belgii*.)

24. **LIÈGE** (Jones).—Height $4\frac{1}{2}$ feet; flowers pale blue tinged* lavender, $1\frac{1}{4}$ inches diameter; flowering from September 22 to October 17; growth rather dense. Raised by Mr. E. Beckett and introduced by sender. (*Novi-Belgii*.)

59. **MISS WILLMOTT** (Ruys).—Height $4\frac{1}{2}$ feet; flowers pale blue tinged lavender, $1\frac{1}{2}$ inches diameter; in flower September 5 to October 8; inclined to run. (*Novi-Belgii*.)

100. **CORDEBELGH A** (Ballard).—Height 5 feet; flowers mauve, 1 inch diameter; in flower September 22 to October 14. Raised by sender. (*Cordifolius* × *Novi-Belgii*.)

88. **ROBINSON V.C.** (Wells), **H.C.**—Height $4\frac{1}{2}$ feet; flowers mostly single, blue tinged mauve, $1\frac{1}{2}$ inches diameter; in flower September 22 to October 18; useful for cutting. (*Novi-Belgii*.)

147. **LAVENDER** (Ruys).—Height $4\frac{1}{2}$ feet; flowers lavender, $1\frac{1}{2}$ inches diameter; flowering from September 10 to October 15. (*Novi-Belgii*.)

51. **PERRY'S MAUVE** (Ruys).—Height $4\frac{1}{2}$ feet; flowers pale bluish-mauve, $1\frac{1}{2}$ inches diameter; in flower September 7 to October 12; inclined to run. (*Novi-Belgii*.)

54. **CORONA** (Ballard).—Height 4 feet; flowers pale heliotrope, $1\frac{1}{2}$ inches diameter; flowering from September 18 to October 20. Raised by sender. (*Novi-Belgii*.)

62, 75. **ANITA BALLARD** (Ballard, Baker), **A.M.**—Height 5 feet; flowers deep lavender-blue, 2 inches diameter; in flower September 10 to October 14; useful for cutting; a very effective variety. (*Novi-Belgii*.)

46. **BRUGES** (Jones), **A.M.**—Height 5 feet; flowers mostly single, pale bluish-grey, 2 inches diameter; in flower September 26 to October 27. Introduced by sender. (*Novi-Belgii*.)

52. **BRUSSELS** (Wells), **H.C.**—Height $4\frac{1}{2}$ feet; flowers very pale blue, $1\frac{3}{4}$ inches diameter; in flower September 22 to October 17. (*Novi-Belgii*.)

76. **CLEOPATRA** (Ballard), **H.C.**—Height 4 feet; flowers pale blue tinged white, 2 inches diameter; in flower October 6 to October 28; useful for cutting. (*Novi-Belgii*.)

b. Semi-double.

83. **Wonder of Colwall**, **A.M.** September 23, 1920. Raised by Mr. Ballard.

57. **Mira**, **H.C.** September 23, 1920. Raised by Mr. Ballard.

44. **Jupiter**, **H.C.** September 23, 1920. Raised by Mr. Ballard.

57. **MIRA** (Ballard), **H.C.**—Height 4 feet; flowers bright lilac, 2 inches diameter, rather ragged; in flower September 7 to October 14. (*Novi-Belgii*.)

94, 95. GLORY OF COLWALL (Ballard, Ruys).—Height 4 feet; flowers pale slate-blue, $1\frac{1}{2}$ inches diameter; flowering from September 28 to October 18; suitable for cutting. Raised by Mr. Ballard. (*Novi-Belgii*)

* * *

44. JUPITER (Ballard), **H.C.**—Height $4\frac{1}{2}$ feet; flowers pale lavender, $1\frac{1}{2}$ inches diameter; in flower September 5 to October 11. (*Novi-Belgii*)

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96, 97. JOAN VAUGHAN (Ballard, Baker).—Height $4\frac{1}{2}$ feet; flowers deep lavender, $1\frac{1}{2}$ inches diameter, tips of the rays a deeper shade; flowering from September 5 to October 12; useful for cutting. Raised by Mr. Ballard. (*Novi-Belgii*)

* * *

83. WONDER OF COLWALL (Ballard), **A.M.**—Height $4\frac{1}{2}$ feet; flowers pale blue, 2 inches diameter; in flower September 8 to October 10; useful for cutting; not yet in commerce. (*Novi-Belgii*)

5. Flowers dark bluish-mauve.

a. Single.

19. Queen, **A.M.** October 8, 1920. Raised by Messrs. Jones.

61. Climax, **A.M.** October 8, 1920 [**A.M.** 1908 (Gibbs)].

69. Grace Mary Lewis, **H.C.** September 23, 1920. Raised by Mr. Ballard.

19. QUEEN (Jones), **A.M.**—Height $5\frac{1}{2}$ feet; flowers light blue, $1\frac{1}{2}$ inches diameter; flowering from September 28 to October 21; useful for cutting; of 'Climax' habit. (*Novi-Belgii*)

* * *

61. CLIMAX (Ruys), **A.M.**—Height 6 feet; flowers clear light blue, $1\frac{1}{2}$ inches diameter; in flower October 4 to October 21; very useful for cutting. (*Novi-Belgii*)

* * *

69. GRACE MARY LEWIS (Ballard), **H.C.**—Height 4 feet; flowers blue, $1\frac{1}{2}$ inches diameter; in flower September 16 to October 17; useful for cutting. (*Novi-Belgii*)

* * *

68. EDITH GOODWIN (Ballard).—Very similar to No. 69, but later to flower. Raised by sender. (*Novi-Belgii*)

* * *

64. MAGNET (Jones).—Height 4 feet; flowers clear blue, $1\frac{1}{2}$ inches diameter; flowering from September 28 to October 18; useful for cutting; 'Climax' form. Raised by sender. (*Novi-Belgii*)

* * *

63. MALINES (Jones).—Height 5 feet; flowers clear bright blue, $1\frac{1}{2}$ inches diameter; in flower September 26 to October 22; desirable for cutting. Raised by Mr. E. Beckett, introduced by sender. (*Novi-Belgii*)

* * *

67. KESTON BLUE (Jones).—Height 5 feet; flowers rich blue, $1\frac{1}{2}$ inches diameter; disc deep yellow; flowering from September 22 to October 22; suitable for cutting. Raised by sender. (*Novi-Belgii*)

* * *

72. HENRY ADAMS (Jones).—Height 5 feet; flowers dark blue, $1\frac{1}{2}$ inches diameter; in flower October 2 to October 27; useful for cutting; inclined to run. Raised by sender. (*Novi-Belgii*)

* * *

74. FELTHAM BLUE (Ruys).—Height $4\frac{1}{2}$ feet; flowers clear dark blue, $1\frac{1}{2}$ inches diameter; flowering from September 7 to October 14; disc golden. (*Novi-Belgii*)

b. Semi-double.

70, 71. Blue Gem, **A.M.** October 8, 1920. Raised by Mr. Ballard [**A.M.** 1918 (Baker)].

70, 71. BLUE GEM (Ballard, Baker), **A.M.**—Height 5 feet; flowers deep blue, $1\frac{1}{2}$ inches diameter; in flower September 28 to October 18; useful for cutting. Introduced by Messrs. Baker. (*Novi-Belgii*)

6. *Flowers purple, single.*

60. PERRY'S BLUE (Ruys).—Height 4 feet; flowers bright lilac-blue, $1\frac{1}{4}$ to $1\frac{1}{2}$ inches diameter; flowering from September 20 to October 20. (*Novi-Belgii*.)

* * *

58. MRS. FRANK BRAZIER (Ruys).—Height 4 feet; flowers clear bright lilac-blue, $1\frac{1}{2}$ inches diameter; in flower September 22 to October 18; desirable for cutting; inclined to run. (*Novi-Belgii*.)

* * *

55. SATURN (Ballard).—Height $4\frac{1}{2}$ feet; flowers pale blue tinged purple, $1\frac{1}{2}$ inches diameter; in flower September 16 to October 8. Raised by sender. (*Novi-Belgii*.)

7. *Flowers rosy-purple.*

a. Single.

5, 6, 8. MRS. S. T. WRIGHT, A.M. September 23, 1920. Raised by Messrs. Jones [A.M. 1907 (Jones)].

5, 6, 8. MRS. S. T. WRIGHT (Jones, Ruys, Jones), A.M.—Height $5\frac{1}{2}$ feet; flowers rosy-purple, 2 inches diameter; in flower September 8 to October 21; useful for cutting. (*Novae-Angliae*.)

b. Semi-double.

87. BRIGHTEST AND BEST, A.M. October 8, 1920.—Raised by Mr. Edwin Beckett (A.M. 1918 (Wells)].

87. BRIGHTEST AND BEST (Wells), A.M.—Height 6 feet; flowers deep rosy-purple, $1\frac{1}{2}$ inches diameter; flowering from September 30 to October 26; desirable for cutting. Introduced by sender. (*Novi-Belgii*.)

8. *Flowers bluish-purple, single.*

7. RYECROFT PURPLE, H.C. September 23, 1920. Raised by Messrs. Jones.

7. RYECROFT PURPLE (Ruys), H.C.—Height 4 feet; flowers rich bluish-purple, $1\frac{1}{4}$ inches diameter; in flower August 30 to October 19; useful for cutting. (*Novae-Angliae*.)

II. HEIGHT 2 TO $3\frac{1}{2}$ FEET (pp. 371, 380).

A. HABIT MORE OR LESS ERECT (p. 378).

1. *Flowers white.*

a. Single.

15. MR. S. A. DE GRAAF (Ruys).—Height $2\frac{1}{2}$ feet; flowers 1 inch diameter; in flower September 14 to October 3. (*Novi-Belgii*.)

* * *

12. DORIS (Ruys).—Height 3 feet; flowers $1\frac{1}{2}$ inches diameter, stained pale blue when old; in flower August 30 to October 1; growth dense. (*Novi-Belgii*.)

* * *

14. FINCHLEY WHITE (Ruys).—Characters as for 'Doris,' but with larger flowers; flowering from August 16 to October 3. (*Novi-Belgii*.)

* * *

158. MRS. BERKELEY (Ruys).—Height 10 inches; flowers $\frac{3}{4}$ inch diameter; disc yellow; in flower August 28 to September 29. (*Acris*.) Included here, though dwarf, on account of habit.

b. Semi-double.

77, 78. J. S. BAKER, H.C. September 23, 1920. Raised by Mr. Ballard [A.M. 1916 (Baker)].

77, 78. J. S. BAKER (Baker, Ballard), H.C.—Height 3 feet; flowers $1\frac{1}{2}$ inches diameter, stained bluish-pink when old; in flower September 10 to October 16; useful for cutting. Introduced by Messrs. Baker. (*Novi-Belgii*.)

2. *Flowers pink.*a. *Single.*

161. **Mrs. Frank Penn, A.M.** October 8, 1920. Raised by Messrs. Jones [A.M. 1913 (Jones)].

28. **Walloon, H.C.** September 23, 1920. Raised by Mr. Edwin Beckett.

29. **Lady Lloyd, H.C.** September 23, 1920. Raised by Mr. Ballard.

41. **ST. EGWYN (Ruys).**—Height 3 feet; flowers pale pink, $1\frac{1}{4}$ inches diameter; flowering from September 10 to October 14; habit very bushy. (*Novi-Belgii.*)

* * *

56. **THELMA PERRY (Ruys).**—Height 3 feet; flowers pale pink, $1\frac{1}{2}$ inches diameter; disc deep yellow; in flower September 18 to October 12. (*Novi-Belgii.*)

* * *

23. **NAMUR (Wells).**—Height 3 feet; flowers soft pale pink, $1\frac{1}{4}$ to $1\frac{1}{2}$ inches diameter; flowering from August 30 to October 14; growth very dense. Raised by Mr. E. Beckett. (*Novi-Belgii.*)

* * *

29. **LADY LLOYD (Ballard), H.C.**—Height $2\frac{3}{4}$ feet; flowers pink, $1\frac{1}{2}$ inches across; in flower September 18 to October 20. (*Novi-Belgii.*)

* * *

28. **WALLOON (Jones), H.C.**—Height 3 feet; flowers pink, $1\frac{1}{2}$ inches diameter; flowering from September 8 to October 14; rather dense in growth; running very badly. Introduced by sender. (*Novi-Belgii.*)

* * *

164. **SEEDLING No. 3 (Simpson).**—Height 3 feet; flowers bright pink, $1\frac{1}{4}$ inches diameter; in flower September 10 to October 14; habit bushy. Raised by sender. (*Novi-Belgii.*)

* * *

36. **NURSE CAVELL (Jones).**—Height $3\frac{1}{2}$ feet; flowers deep pink, $1\frac{1}{4}$ inches across; flowering from September 18 to October 28; habit bushy; inclined to run. Raised by Mr. E. Beckett, introduced by sender. (*Novi-Belgii.*)

* * *

161. **MRS. FRANK PENN (Jones), A.M.**—Height $3\frac{1}{4}$ feet; flowers deep pink, $1\frac{1}{4}$ inches diameter; in flower September 30 to October 22. (*Novi-Belgii.*)

* * *

42. **EDNA MERCIER (Ruys).**—Height $3\frac{1}{2}$ feet; flowers bright pinkish-red, $\frac{3}{4}$ inch diameter; in flower August 30 to October 7; habit bushy. (*Novi-Belgii.*)

b. *Semi-double.*

82. **Dick Ballard, A.M.** September 23, 1920. Raised by Mr. Ballard.

82. **DICK BALLARD (Ballard), A.M.**—Height 2 feet; flowers rosy pink, $1\frac{1}{4}$ inches diameter; flowering from September 8 to October 20; buds very attractive. (*Novi-Belgii.*)

3. *Flowers pale lilac, single.*

159. **ACRIS, H.C.** September 23, 1920.

53. **EMPRESS (Ballard).**—Height 3 feet; flowers 2 inches diameter, rays rather loose; in flower September 10 to October 10; useful for cutting. Raised by sender. Not yet in commerce. (*Novi-Belgii.*)

* * *

159. **ACRIS (Ruys), H.C.**—Height $2\frac{3}{4}$ feet; flowers $1\frac{1}{2}$ inches diameter, rays stellate; flowering from August 28 to October 10. (*Acris.*)

4. *Flowers pale blue, single.*

65. **MOONLIGHT, H.C.** October 8, 1920. Raised by Mr. Ballard.

65. **MOONLIGHT (Ballard), H.C.**—Height $3\frac{1}{2}$ feet; flowers 2 inches diameter; flowering from September 26 to October 14; useful for cutting. (*Novi-Belgii.*)

5. *Flowers bluish-mauve, semi-double.*

92, 93. **Beauty of Colwall, A.M.** September 23, 1920. Raised by Mr. Ballard [F.C.C. 1907 (Ballard)].

80, 81. **Rachel Ballard, A.M.** September 23, 1920. Raised by Mr. Ballard.

92, 93. **BEAUTY OF COLWALL** (Ballard, Ruys), **A.M.**—Height 3½ feet; flowers deep lavender-blue, 1½ inches diameter; flowering from September 8 to October 14; useful for cutting. (*Novi-Belgii.*)

* * *

89. **CLOUDY BLUE** (Ballard).—Height 3 feet; flowers pale blue, 2 inches diameter; flowering from September 20 to October 16. Raised by sender. (*Novi-Belgii.*)

* * *

85, 86. **PEGGY BALLARD** (Ruys, Ballard).—Height 3½ feet; flowers rosy-lilac, 1½ inches diameter; in flower September 30 to October 20. Raised by Mr. Ballard. (*Novi-Belgii.*)

* * *

80, 81. **RACHEL BALLARD** (Ballard, Baker), **A.M.**—Height 2 feet; flowers rosy-lilac, 1½ inches diameter; flowering from September 22 to October 18. (*Novi-Belgii.*)

6. *Flowers dark bluish-mauve, single.*

73. **Cardinal Mercier, H.C.** September 23, 1920. Raised by Mr. Edwin Beckett.

73. **CARDINAL MERCIER** (Jones), **H.C.**—Height 3 feet; flowers dark blue, 1½ inches diameter; flowering from September 16 to October 16, growth somewhat dense. (*Novi-Belgii.*)

* * *

84. **KING ALBERT** (Ballard).—Height 2 feet; flowers bluish-violet, 1½ inches diameter; in flower September 23 to October 20. Raised by sender. (*Novi-Belgii.*)

7. *Flowers deep purple tinged lilac, semi-double.*

90, 91. **Nancy Ballard, H.C.** September 23, 1920. Raised by Mr. Ballard [A.M. 1912 (Ballard)].

90, 91. **NANCY BALLARD** (Ruys, Ballard), **H.C.**—Height 3½ feet; flowers 1½ inches diameter; flowering from September 22 to October 16. (*Novi-Belgii.*)

B. *HABIT BUSHY* (p. 376.)1. *Flowers white, single.*

107. **Chastity, A.M.** October 8, 1920. Sent by Messrs. Baker [A.M. 1909 (Gibbs)] as 'Bianca.'

125. **Golden Rain, A.M.** October 8, 1920. Raised by Messrs. Jones.

127. **Vimineus, H.C.** October 8, 1920. Sent by Messrs. Ruys.

167. **BIANCA** (Ruys).—Height 3½ feet; flowers ¾ inch diameter; flowering from September 30 to October 27; useful for cutting. (*diffusus.*)

107. **CHASTITY** (Baker), **A.M.**—A very good form of 'Bianca.'

* * *

108. **MAIDENHOOD** (Ruys).—Height 3 feet; flowers ½ inch diameter; in flower September 30 to October 29. (*ericoides.*)

* * *

127. **VIMINEUS** (Ruys), **H.C.**—Height 3 feet; flowers ½ inch diameter; flowering from September 30 to October 26; habit bushy.

* * *

105. **TRADESCANTI** (Ruys).—Height 3 feet; flowers ¾ inch across; in flower October 2 to October 30; habit bushy.

* * *

125. **GOLDEN RAIN** (Jones), **A.M.**—Height 3 feet; flowers creamy-white, ⅝ inch diameter; disc yellow; flowering from September 30 to October 28; habit erect. (*vimineus.*)

2. *Flowers pink, single.*

113. **MAY, H.C.** October 8, 1920. Raised by Messrs. Jones.

129. **Dorothy, H.C.** October 8, 1920. Raised by Messrs. Jones.

131. **RONNIE (Jones).**—Height 3 feet; flowers white tinged pink, $\frac{1}{4}$ inch diameter; in flower September 26 to October 26; habit bushy. Raised by sender. (*vimineus*.)

* * *

113. **MAY (Jones), H.C.**—Height 3 feet; flowers white tinted pink, $\frac{5}{8}$ inch diameter; in flower October 7 to October 27. (*ericoides*.)

* * *

112. **GLADYS ADAMS (Jones).**—Height 3 feet; flowers dull white tinged pink, $\frac{5}{8}$ inch diameter; flowering from October 5 to October 28. Raised by sender. (*ericoides*.)

* * *

129. **DOROTHY (Jones), H.C.**—Height 2 $\frac{3}{4}$ feet; flowers very pale pink, $\frac{1}{2}$ inch diameter; flowering from September 22 to October 25; compact habit. (*vimineus*.)

* * *

130. **PEARL (Jones).**—Very similar to 'Dorothy,' but of darker colour and dwarfer habit. Raised by sender. (*vimineus*.)

* * *

115. **OPHIR (Ruys).**—Height 3 feet; flowers pale pink, $\frac{5}{8}$ inch diameter; in flower September 8 to October 14. Raised by Mr. E. Beckett. (*ericoides*.)

3. *Flowers bluish-mauve, single.*

118. **Silver Gem, A.M.** October 8, 1920. Raised by Messrs. Jones.

110. **Katherine, A.M.** October 8, 1920. Raised by Messrs. Jones.

102. **Ideal, H.C.** October 8, 1920. Sent by Messrs. Ruys.

123. **Mrs. A. E. Underdown, H.C.** October 8, 1920. Raised by Messrs. Jones.

119. **Amy, H.C.** October 8, 1920. Raised by Messrs. Jones.

116. **Mona, H.C.** October 8, 1920. Raised by Messrs. Jones.

114. **CONNIE (Jones).**—Height 3 feet; flowers white tinged lavender, $\frac{1}{2}$ inch diameter; in flower October 7 to October 30; useful for cutting. Raised by sender. (*ericoides*.)

* * *

102. **IDEAL (Ruys), H.C.**—Height 3 feet; flowers pale mauve, $\frac{3}{4}$ inch diameter; flowering September 22 to October 28; suitable for cutting. (*cordifolius*.)

* * *

123. **MRS. A. E. UNDERDOWN (Jones), H.C.**—Height 3 feet; flowers pale lavender, $\frac{5}{8}$ inch diameter; in flower September 30 to October 28. (*ericoides*.)

* * *

133. **YVETTE RICHARDSON (Jones).**—Height 2 $\frac{1}{2}$ feet; flowers pale lavender, 1 inch diameter; disc yellow; flowering from October 10 to October 29; habit compact. Raised by sender. (*vimineus*.)

* * *

132. **STARLIGHT (Jones).**—Height 2 $\frac{1}{2}$ feet; flowers lilac-mauve, $\frac{1}{2}$ inch diameter; disc pale yellow; in flower September 26 to October 26; growth rather dense. Raised by sender. (*vimineus*.)

* * *

135. **SHORTII (Ruys).**—Height 3 $\frac{1}{2}$ feet; flowers pale lilac-blue, 1 $\frac{1}{2}$ inches diameter; rays stellate; disc very pale yellow; flowering from August 30 to October 8.

* * *

118. **SILVER GEM (Jones), A.M.**—Height 3 $\frac{1}{2}$ feet; flowers silver tinged lavender, $\frac{5}{8}$ inch diameter; flowering from September 28 to October 26; useful for cutting. (*ericoides*.)

* * *

120. **MARGARET (Jones).**—Height 3 feet; flowers pale grey, $\frac{5}{8}$ inch diameter; flowering from October 7 to October 27. Raised by sender. (*ericoides*.)

119. AMY (Jones), **H.C.**—Height 3 feet; flowers silvery mauve, $\frac{5}{8}$ inch diameter; in flower September 30 to October 26; useful for cutting; graceful habit. (*ericoides*.)

* * *

117. MRS. FARLEY (Jones).—Height $3\frac{1}{2}$ feet; flowers rosy-grey, $\frac{5}{8}$ inch diameter; in flower September 28 to October 27. Raised by sender. (*ericoides*.)

* * *

110. KATHERINE (Jones), **A.M.**—Height 3 feet; flowers rosy-mauve, $\frac{3}{4}$ inch diameter; flowering from September 30 to October 29; useful for cutting. (*ericoides*.)

* * *

116. MONA (Jones), **H.C.**—Height 2 feet; flowers rosy-mauve, $\frac{1}{2}$ inch diameter; disc old rose; in flower September 26 to October 27; graceful habit. (*ericoides*.)

4. Flowers dark bluish-mauve, single.

121. **Blue Star, H.C.** October 8, 1920. Sent and raised by Messrs. Jones.

121. BLUE STAR (Jones), **H.C.**—Height $3\frac{1}{2}$ feet; flowers pale blue, $\frac{5}{8}$ inch diameter; flowering from October 7 to October 30. (*ericoides*.)

* * *

122. MR. ARTHUR G. N. LAUNDER (Jones).—Very similar to 'Blue Star,' but flowers smaller and paler; disc a deeper shade of yellow. Raised by sender. (*ericoides*.)

* * *

103. MAGNIFICUS (Ruys).—Height 3 feet; flowers dark lilac-blue, 1 inch diameter; in flower September 22 to October 28. (*cordifolius*.)

* * *

101. CORDEBELGH B (Ballard).—Height 3 feet; flowers dark blue, $1\frac{1}{4}$ inches diameter; disc pale yellow; flowering from September 22 to October 30. Raised by sender. (*cordifolius* \times *Novi-Belgii*.)

III. HEIGHT 1 FOOT TO 2 FEET (pp. 371, 376).

1. Flowers pink, single.

141. WIENHOLTZI, **A.M.** September 23, 1920. Sent by Messrs. Ruys.

143. PERRY'S FAVOURITE, **H.C.** October 8, 1920. Raised by Messrs. Perry [**A.M.** 1904 (Perry)].

141. WIENHOLTZI (Ruys), **A.M.**—Height 22 inches; flowers pale pink, $2\frac{1}{4}$ inches diameter; disc deep yellow; flowering from September 8 to October 20; useful for cutting. (*amellus*.)

* * *

143. PERRY'S FAVOURITE (Ruys), **H.C.**—Height $2\frac{1}{4}$ feet; flowers pink, $1\frac{1}{4}$ inches diameter; flowering from September 18 to October 25; useful for cutting. (*amellus*.)

* * *

136. MADAME POICHAUVIN (Ruys).—Height 2 feet; flowers deep rosy-pink, $1\frac{1}{2}$ inches diameter; in flower September 22 to October 30. (*amellus*.)

* * *

137, 138. MADAME GAUGUIN (Ruys, Baker).—Height 15 inches; flowers very deep rose-pink, $1\frac{3}{8}$ inches diameter; flowering from September 18 to October 26. (*amellus*.)

2. Flowers pinkish-mauve, single.

144, 145. **Beauty of Ronsdorf, A.M.** October 8, 1920. Raised by Messrs. Arends [**A.M.** 1913 (Ware)].

149. Rubellus, **A.M.** October 8, 1920. Sent by Messrs. Ruys.

146. Lavanda, **H.C.** September 23, 1920. Raised by Messrs. Baker.

146. LAVANDA (Baker), **H.C.**—Height 22 inches; flowers pale lavender, $2\frac{1}{4}$ inches diameter; disc golden; in flower September 10 to October 24; useful for cutting. (*amellus*.)

* * *

145. BEAUTY OF RONSDOFF (Baker), } **A.M.**—Height 20 inches; flowers pale
144. SCHÖNE VON RONSDOFF (Ruys), }
lavender-pink, $2\frac{1}{4}$ inches diameter; disc golden; flowering from September 18 to October 26; useful for cutting. (*amellus*.)

149. RUBELLUS (Ruys), **A.M.**—Height 2 feet; flowers lavender-pink, 2 inches diameter; disc yellow; in flower September 18 to October 21; useful for cutting. (*amellus*.)

* * *

98. LUTETIA (Ruys).—Height $2\frac{1}{2}$ feet; flowers $2\frac{1}{4}$ inches diameter, soft rosy-lilac; in flower September 8 to November 3; useful for cutting. (*amellus* × *Novi-Belgii*.)

3. Flowers bluish-mauve, single.

150, 151. **King George, F.C.C.** September 23, 1920. Sent by Messrs. Ruys, Wells [**A.M.** 1914 (Perry)].

148. **Rudolph Goethe, A.M.** September 23, 1920. Sent by Messrs. Ruys.

156. THOMSONII

157. THOMSONII NANUS } (Ruys).—Height 1 foot; flowers light lilac-blue, $2\frac{1}{4}$ inches diameter; disc golden; in flower August 16 to October 26.

* * *

148. RUDOLPH GOETHE (Ruys), **A.M.**—Height 2 feet; flowers lavender-blue, $2\frac{1}{2}$ inches diameter; disc golden; flowering from September 7 to October 20; suitable for cutting. (*amellus*.)

* * *

150, 151. **KING GEORGE** (Ruys, Wells), **F.C.C.**—Height $2\frac{1}{4}$ feet; flowers $2\frac{3}{4}$ inches diameter, bluish-violet; disc golden; in flower September 7 to October 14; very useful for cutting. (*amellus*.)

4. Flowers dark bluish-mauve, single.

152. **Cassubicus, A.M.** September 23, 1920. Sent by Messrs. Ruys.

139. **Mrs. Perry, A.M.** October 8, 1920. Raised by Messrs. Perry.

154. **Beauté parfaite, H.C.** September 23, 1920. Sent by Messrs. Ruys.

152. CASSUBICUS (Ruys), **A.M.**—Height 2 feet; flowers violet, 2 inches diameter; disc yellow; flowering from September 7 to October 19; suitable for cutting. (*amellus*.)

* * *

154. **BEAUTÉ PARFAITE** (Ruys), **H.C.**—Height 2 feet; flowers dark violet, 2 inches diameter; disc deep yellow; in flower September 8 to October 19; useful for cutting. (*amellus*.)

* * *

139. **MRS. PERRY** (Ruys), **A.M.**—Height 20 inches; flowers blue tinged purple, $1\frac{3}{4}$ inches diameter; disc deep yellow; flowering from September 10 to October 24; useful for cutting. (*amellus*.)

EARLY PEAS AT WISLEY, 1920.

ONE hundred and twenty stocks of peas were sent for inclusion in the trial at Wisley in 1920. They were sown on March 3, on ground that had been dug and manured with pig manure in the autumn of 1919, the distances between the rows varying from 3 feet 6 inches for the dwarf to 6 feet for the tall varieties. Almost all stocks germinated well and made excellent growth. They were staked on April 20. Most varieties attained a height somewhat greater than that claimed for them, and they are classified below accordingly. It became necessary to fix an arbitrary date beyond which a variety should not be regarded as first early, and June 11 was chosen; and another, beyond which a variety could not be included even among the second-early varieties, viz. June 20. The time of readiness was decided not by the earliest pod but by the time a good picking could be secured from the row (33 feet). A comparison of the classification of the peas in the previous trial in 1915 with the present one shows that almost without exception the varieties represented in both trials have behaved the same as regards season in both. In some instances it will be seen that some stocks of a variety are earlier than others, and this may be due to (1) differences in the localities from which the seed was derived, (2) selection for earliness, or (3) untrueness of a proportion of the stock. The stocks were, on the whole, fairly true and good, but in some cases care had not been taken to rogue for regularity of height, or shape of pod, or colour of pod. It is probable that if mass selection, still depended upon by some in the "fixing" of new varieties, were abandoned, and the practice of growing from individuals adopted, and from among their progeny selecting pure lines, a very great deal of the necessity for continued selection and roguing would be obviated.

It will be noticed that one or two varieties usually regarded as maincrop varieties gave crops sufficiently early to be included among the early varieties, thus showing their great value for several purposes, their season varying with date of sowing. A considerable number proved too late for inclusion; these are not further alluded to below, viz., Nos. 15, 39, 41-43, 46, 48, 49, 52, 55, 56, 58, 60, 70, 100, 108, 110, 113, 115-118, 120.

The Judging Committee inspected the trial at intervals, and in making recommendations for awards took into consideration not only the cropping capacity of the varieties and their earliness, but also the flavour and size of the peas, the yield of peas for the volume of pods (green peas are usually sold by volume), the colour of the pod—the dark pod finding the greatest favour since it remains fresh-looking longer—and the ease of shelling. Upon this basis they made the following recommendations:

Award of Merit.

- 1. Reading Wonder, sent by Messrs. Sutton.
- 47. Prosperity, sent by Messrs. Toogood.
- 54. Electricity, sent by Messrs. Cooper-Taber.
- 59. Skipper, sent by Messrs. Laxton.
- 71. Aviator, sent by Messrs. Laxton.
- 72. S. T. Wright, sent by Messrs. Laxton.
- 73, 74. Admiral Beatty, sent by Messrs. Laxton, Nutting.
- 79, 80. Primo, sent by Messrs. Watkins & Simpson, Nutting.
- 114. Duke of Albany, sent by Messrs. Sutton (**A.M.** 1916 [Sutton]).

Highly Commended.

- 7. Chelsea Gem, sent by Messrs. Sutton (**F.C.C.** 1887 [J. Veitch]).
- 28, 30. Little Marvel, sent by Messrs. Sutton, R. Veitch (**A.M.** 1902 [Sutton]).
- 35. Prince Arthur, sent by Messrs. Sutton.
- 37. Paragon, sent by Mr. Dawkins.
- 40. Reading Market, sent by Messrs. Sutton.
- 44, 45. Superb, sent by Messrs. Nutting, Toogood (**A.M.** 1913 [Laxton]).
- 50. Harbinger, sent by Mr. Holmes.
- 55, 56. King Edward, sent by Messrs. Simpson, Sutton (**A.M.** 1911 [Sutton]).
- 62. Earliest of All, sent by Messrs. Barr.
- 65. Ringleader, sent by Messrs. Sutton.
- 82, 83. Thomas Laxton, sent by Messrs. Barr, Nutting (**A.M.** 1915 [Barr]).
- 98. Pilot Improved, sent by Messrs. Sutton.
- 101. Royal Standard, sent by Mr. Sowman.
- 112. Edwin Beckett, sent by Messrs. Nutting (**F.C.C.** 1900 [Beckett]).

Commended.

- 13. Radium, sent by Messrs. Dicks.
- 18. Peter Pan, sent by Messrs. R. Veitch.
- 19, 20, 21. Marvellous, sent by Messrs. Simpson, Dawkins, Kelway.
- 61. Earliest of All, sent by Messrs. Kelway.
- 67, 68, 69. Eclipse, sent by Messrs. Sutton, Nutting, Kelway.
- 75, 76, 77. World's Record, sent by Messrs. Kelway, Simpson, Sutton (**A.M.** 1915 [Sutton]).
- 82, 83. Thomas Laxton, sent by Messrs. Barr, Nutting (**A.M.** 1915 [Barr]).
- 85. William I., sent by Messrs. Barr.
- 86. William I. Improved, sent by Messrs. Sutton (**F.C.C.** 1915 [Barr, Sutton]).
- 88. Bountiful, sent by Messrs. Sutton.
- 96. Dora, sent by Mr. Lowder.

In addition to those which are pointed out above as having previously obtained awards, the following, which had gained awards in previous years, were

represented in the trials, but were not regarded in the present trial as of such high standard as to merit one in comparison with others in the trial, viz.:

No. 2, Harbinger (**A.M.** 1915 [Sutton]); No. 11, Green Gem (**A.M.** 1905 [Sutton]); No. 34, Hundredfold (**A.M.** 1910 [Sutton]); Nos. 25, 26, Laxtonian (**A.M.** 1910 [Carter]); Nos. 31-33, Excelsior (**A.M.** 1905 [Sutton]); No. 36, The Sherwood (**A.M.** 1901 [Hurst, Sutton]); Nos. 94, 95, Exonian (**F.C.C.** 1887 [R. Veitch]); Nos. 91, 92, Gradus (**F.C.C.** 1887 [Laxton]); No. 105, A 1 (**A.M.** 1915 [Sutton]); No. 106, Western Express (**A.M.** 1902 [R. Veitch]); Nos. 90, 93, Ideal (**F.C.C.** 1903 [Sutton]); No. 102, Duchess of York (**A.M.** 1915 [Sutton]); No. 84, Ameer (**A.M.** 1901 [Sutton]).

In arranging the peas in this report and in indicating likenesses etc., we have been greatly assisted by Messrs. S. B. Dicks and Giles and we take this opportunity of expressing our thanks to them.

NOTES AND DESCRIPTION.

I. FIRST EARLY VARIETIES.

(a) 1 to 1½ foot.

1. *Seeds round.*

*6. EIGHT WEEKS (Barr).—Haulm 13 inches, dark green; pods single, straight, 3 inches, rather pointed, very dark green; peas of medium size, bright green, 7 or 8 in a pod; crop good. Ready June 11. Introduced by Messrs. Carter.

2. *Seeds Wrinkled.*

1. READING WONDER (Sutton), **A.M.** June 11, 1920.—Haulm 16 inches, stout, dark green; pods double, straight, 3 inches, blunt, dark green; peas large, bright green, 7 or 8 in a pod; sweet and juicy; crop good. Ready June 11. Raised by senders.

* * *

2. HARBINGER (Sutton).—Described vol. xli. p. 283; crop good. Ready June 11. Raised by senders.

* * *

3, 4, 5. AMERICAN WONDER (Sutton, Barr, Kelway).—Described in vol. 41, p. 284. No. 3, like the original stock, had lighter pods than Nos. 4, 5, while No. 5 was very mixed. Introduced by Messrs. Sutton, from America.

* * *

7. CHELSEA GEM (Sutton), **H.C.** June 11, 1920.—Haulm medium, dark green; pods single, somewhat curved, 3 inches, slightly pointed, dark green; peas large, light bright green, 8 in a pod; crop good. Ready June 11. Introduced by Messrs. J. Veitch.

(b) 2 to 3 feet.

1. *Seeds wrinkled.*

28, 30. LITTLE MARVEL (Sutton, R. Veitch), **H.C.** June 11, 1920.—Haulm 2 feet, medium green; pods in pairs, 3 inches, blunt, straight, dark green; peas of medium size, bright green, 6 or 7 in a pod; crop good. Ready June 11. Raised by Messrs. Sutton.

27, 29, 119. LITTLE MARVEL (Barr, Nutting, Kelway).—Similar to foregoing, but contained rogues.

* * *

13. RADIUM (Dicks), **C.**, June 11, 1920.—Scarcely distinct from 'Little Marvel,' but haulm darker. Crop good. Ready June 11. Raised by sender.

(c) 3 to 4½ feet.

1. *Seeds round.*

62. EARLIEST OF ALL (Barr), **H.C.** June 11, 1920.—Haulm stout, medium green; pods single, 2½ inches, blunt, straight, dark green; peas of medium size, light green, 7 or 8 in a pod; crop good. Ready June 11.

61. EARLIEST OF ALL (Kelway), **C.**, June 11, 1920.—Stock very irregular in height.

* See footnote, p. 359.

67, 68, 69. ECLIPSE (Sutton, Nutting, Kelway), C. June 11, 1920.—Characters as for 'Earliest of All'; crop good. Ready June 11. Raised by Messrs. Harrison of Leicester.

86. WILLIAM I. IMPROVED (Sutton), C. June 11, 1920.—Described vol. xli. p. 283; crop good. Ready June 11. Raised by sender.

* * *

64. SANGSTER'S NO. 1 (Sutton).—Haulm stout, dark green; pods in pairs, $2\frac{1}{2}$ inches, blunt, straight, medium green; peas of medium size, light green, 7 peas in a pod; crop medium. Ready June 11.

111. FIRST AND BEST (Kelway).—Characters as foregoing, except pods single, 3 inches; crop medium. Ready June 11. Raised and introduced by Messrs. Dickson.

* * *

65. RINGLEADER (Sutton), H.C. June 11, 1920.—Haulm stout, light green; pods single, 3 inches, blunt, straight, medium green; peas large, light green, 6 or 7 peas in a pod; crop good. Ready June 11. Raised by sender.

2. *Seeds wrinkled.*

104. FIRST OF ALL (Sutton).—Haulm 3 to $3\frac{1}{2}$ feet, stout, light green; pods single, straight, pointed, $3\frac{1}{2}$ inches, medium green; peas large, medium green, 8 or 9 peas in a pod; crop good. Ready June 11, bearing over a long season. Raised by sender.

* * *

81. MAY QUEEN (Sutton).—Described in vol. xli. p. 282. Crop medium, and many pods failed to fill properly. Ready June 11. Raised by sender.

II. SECOND EARLY VARIETIES.

(a) 1 to $1\frac{1}{2}$ feet.

1. *Seeds wrinkled.*

22. WARWICKSHIRE PRIDE (Simpson).—Haulm stout, dark green; pods in pairs, straight, light green, blunt, $3\frac{1}{2}$ inches; peas large, light green, 5 or 6 in a pod; crop good. Ready June 20.

* * *

10. SEEDLING (Sutton).—Haulm stout, dark green; pods single, straight, $2\frac{1}{2}$ to 3 inches, light green, rather pointed; peas of medium size, bright green, 7 peas in a pod; crop good. Ready June 17. Raised by sender.

* * *

8, 9. CHELSEA GEM (R. Veitch, Kelway).—Haulm stout, medium green; pods in pairs, pointed, $2\frac{1}{2}$ to 3 inches, straight, medium green; peas of medium size, light bright green, 6 or 7 peas in a pod; crop good. Ready June 16. Raised by Messrs. J. Veitch. Compare No. 7.

* * *

11. GREEN GEM (Sutton).—Haulm medium, dark green; pods single, $3\frac{1}{2}$ inches, somewhat pointed, straight, medium green; peas of medium size, 7 or 8 peas in a pod, medium green; crop good. Ready June 18. Raised by Messrs. Sutton.

* * *

51. REFERENDUM (Kelway).—Haulm stout, medium green; pods single, $3\frac{1}{2}$ inches, somewhat blunt, somewhat curved, dark green; peas large, 8 or 9 in a pod, bright green; crop very good. Ready June 20. Introduced by sender.

(b) 2 to 3 feet.

1. *Seeds round.*

44, 45. SUPERB (Nutting, Toogood), H.C. June 11, 1920.—Haulm stout, medium green; pods single, 4 inches, blunt, somewhat curved, dark green; peas large, bright green, 8 or 9 in a pod; crop very good. Ready June 12. Raised by Messrs. Laxton.

99. SUPERB (Kelway).—This stock contained rogues of the broad-podded type.

* * *

107. EARLY SUNRISE (Kelway).—Haulm stout, dark green; pods mostly single, 3 inches, blunt, straight, medium green; peas of medium size, light green, 6 in a pod; crop good. Ready June 17. Raised and introduced by Messrs. Day.

2. *Seeds wrinkled.*

34. HUNDREDFOLD (Sutton).—Haulm 2 feet, stout, dark green; pods single, $3\frac{1}{2}$ inches, pointed, somewhat curved, medium green; peas large, bright green, 7 or 8 in a pod; crop good; Ready June 19. Raised by sender.

37. PARAGON (Dawkins), H.C. June 21, 1920.—Characters as foregoing, except pods somewhat blunt and more curved; crop very good. Ready June 19. Not yet in commerce.

25. LAXTONIAN (Simpson).—Character as No. 37, except haulm medium green; pods straight, 7 or 9 peas in a pod; crop good. Ready June 17.

26. LAXTONIAN (Nutting), differed from No. 25 in its darker foliage, and more pointed curved pods; crop good. Ready June 21. Raised by Messrs. Laxton.

31, 32, 33. EXCELSIOR (Barr, Nutting, Sutton).—Characters as for 'Laxtonian,' except height 2 foot 3 inches; pods blunt, light green; peas light green, inclined to be slightly mealy. Ready June 18. No. 31 was paler than Nos. 32 and 33. Raised by Messrs. Sutton.

23. ENGLISH WONDER (Simpson).—Haulm 2 feet, stout, medium green; pods in pairs, $2\frac{3}{4}$ inches, blunt, straight, medium green; peas of medium size, 6 or 7 peas in a pod, bright green; crop good. Ready June 18.

24. WILLIAM HURST (Kelway).—Proved to be a pointed form of 'English Wonder'; crop good. Ready June 20.

14. WITHAM WONDER (Kelway).—Haulm 2 feet, stout, dark green; pods in pairs, $3\frac{1}{4}$ inches, rather pointed, straight, medium green; peas of medium size, bright green, 7 peas in a pod; crop good. Ready June 20. Raised by Messrs. Cooper-Taber.

36. THE SHERWOOD (Kelway).—Described in vol. xliii. p. 502. Crop medium. Ready June 19.

12. MIGHTY ATOM (Dicks).—Haulm 2 feet, stout, medium to dark green; pods single, $3\frac{1}{4}$ inches, rather pointed, straight, medium green; peas large, bright green, 8 tightly packed peas in a pod; crop medium. Ready June 16. This stock contained taller rogues and forms with curved pods. Raised by sender.

18. PETER PAN (R. Veitch), C. June 11, 1920.—Haulm 2 feet, stout, medium green; pods single, 4 inches, rather pointed, straight, dark green; peas large, bright green, 8 or 9 in a pod; crop good. Ready June 12. Introduced by Messrs. Watkins & Simpson.

16, 17. PETER PAN (Watkins & Simpson, Barr).—Similar to foregoing but later. Ready June 18.

19. MARVELLOUS (Simpson), C. June 11, 1920. Haulm 2 feet 3 inches, stout, medium green; pods single, 4 inches, pointed, straight, dark green; peas large, bright green, 7 or 8 in a pod; crop good. Ready June 12. Raised by Messrs. Hurst.

20, 21. MARVELLOUS (Dawkins, Kelway), C. June 11, 1920.—Characters as foregoing, except pods $2\frac{3}{4}$ inches, blunt.

35. PRINCE ARTHUR (Sutton), H.C. June 11, 1920.—Characters as in Nos. 20, 21, except pods $3\frac{1}{4}$ inches; flavour of peas very sweet and juicy. Raised by sender.

40. READING MARKET (Sutton), H.C. June 21, 1920.—Haulm $2\frac{1}{2}$ feet, stout, medium green; pods single, $3\frac{1}{2}$ inches, blunt, straight, medium green; peas large, bright green, 7 or 8 in a pod; crop very good. Ready June 19. Raised by sender, not yet introduced.

38. PIONEER (Sutton).—Haulm 2 feet, stout, medium green; pods single, $3\frac{1}{4}$ inches, pointed, slightly curved, medium green; peas large, bright green,

8 or 9 in a pod, flavour sweet; crop medium. Ready June 19. This stock contained several plants with larger and broader pods than the true type. Raised by sender.

* * *

103. EMPRESS OF INDIA (Sutton).—Haulm 3 feet, stout, light green; pods single, $3\frac{1}{2}$ inches, pointed, straight, medium green; peas of medium size, light green, 6 or 7 in a pod; crop good. Ready June 15. Raised by sender.

(c) 3 to $4\frac{1}{2}$ feet.

1. *Seeds round.*

50. HARBINGER (Holmes), **H.C.** June 11, 1920.—Haulm stout, medium green; pods in pairs, 4 inches, blunt, straight, dark green; peas of medium size, bright green, 8 in a pod; flavour sweet; crop good. Ready June 12. Raised by sender. Differs from No. 2. Needs selection.

* * *

57. EARLY SOMERSET (Kelway).—Haulm stout, light green; pods single, $3\frac{1}{2}$ inches, blunt, serpette, medium green; peas of medium size, light green, 8 in a pod; crop medium. Ready June 12. Introduced by sender.

* * *

89. ACQUISITION (Sutton).—Haulm stout, medium green; pods mostly single, 4 inches, pointed, straight, medium green; peas large, light green, 8 or 9 peas in a pod; crop good. Ready June 16. Raised by sender.

* * *

98. PILOT IMPROVED (Sutton), **H.C.** June 11, 1920.—Haulm light green; pods single, $3\frac{1}{2}$ inches, rather blunt, straight, dark green; peas large, bright green, 7 or 8 in a pod; crop good. Ready June 15.

97. THE PILOT (R. Veitch).—Characters as foregoing, except pods pointed, slightly curved backwards; crop medium. Ready June 12.

* * *

79, 80. PRIMO (Watkins & Simpson, Nutting), **A.M.** June 11, 1920.—Haulm stout, medium green; pods single, $3\frac{1}{2}$ to 4 inches, straight, pointed, medium green; peas large, bright green, 8 or 9 in a pod; crop very good. Ready June 12. Raised by Messrs. Watkins & Simpson.

* * *

109. ESSEX STAR (Cooper-Taber).—Haulm stout, light green; pods in pairs, $3\frac{3}{4}$ inches, rather pointed, curved, medium green; peas large, deep green, 9 or 10 tightly packed peas in a pod; crop good. Ready June 19. Introduced by Messrs. Cullen.

* * *

85. WILLIAM I. (Barr), **C.** June 11, 1920.—Haulm stout, medium green; pods in pairs, 3 inches, pointed, curved, dark green; peas of medium size, bright green, 8 or 9 in a pod; crop good. Ready June 12. Raised by Messrs. Laxton. Compare No. 86, which is quite distinct.

* * *

87. STANDWELL (Cooper-Taber).—Characters as foregoing, except pods single, 4 inches, blunter, medium green; peas large, light green, 9 or 10 in a pod. Ready June 16. Raised by sender.

* * *

66. EARLIEST BLUE (Sutton).—Haulm stout, medium green; pods medium green, single, 3 inches, blunt, straight; peas small, light yellowish green, 6 or 7 in a pod; crop medium. Ready June 12. Raised by sender.

2. *Seeds wrinkled.*

96. DORA (Lowder), **C.** June 21, 1920.—Haulm sturdy, medium green; pods in pairs, $3\frac{1}{4}$ inches, rather pointed, light green; peas large, light green, 8 in a pod; crop very good. Ready June 20. Raised and introduced by sender.

* * *

94. EXONIAN (Nutting).—Haulm $3\frac{1}{2}$ feet, stout, medium green; pods single, 3 inches, blunt, straight, dark green, peas large, bright green, 7 or 8 in a pod, flavour inclined to be mealy; crop good. Ready June 12. Raised by Messrs. R. Veitch.

95. EXONIAN (R. Veitch).—A mixed stock of foregoing, contained pointed and blunt pods.

75, 76, 77. **WORLD'S RECORD** (Kelway, Simpson, Sutton), **C.** June 21, 1920.—Described in vol. xli. p. 283; crop good. Ready June 18. Raised by Messrs. Sutton.

78. **WORLD'S RECORD** (Toogood).—Characters as foregoing, but very irregular in height.

* * *

91, 92. **GRADUS** (Barr, Nutting).—Described in vol. xliii. p. 505; height 4½ feet; crop good. Ready June 19. Raised by Messrs. Laxton.

47. **PROSPERITY** (Toogood), **A.M.** June 11, 1920.—Characters of 'Gradus,' of which this was a very good stock; crop very good. Ready June 12.

106. **WESTERN EXPRESS** (R. Veitch).—A mixed stock of 'Gradus' type; crop good. Ready June 19. Raised by sender.

* * *

105. **A 1** (Sutton).—Described in vol. xli. p. 281; height 3½ feet; crop good. Ready June 14. Raised by sender.

* * *

90, 93. **IDEAL** (Sutton, Kelway).—Haulm medium green; pods single, 4½ inches, somewhat inflated, blunt, straight, medium green; peas large, bright green, 8 in a pod; crop good. Ready June 20. Raised by Messrs. Sutton.

* * *

102. **DUCHESS OF YORK** (Sutton).—Described in vol. xli. p. 284; height 3½ feet; crop good. Ready June 19. Somewhat irregular stock. Raised by sender.

* * *

54. **ELECTRICITY** (Cooper-Taber), **A.M.** June 11, 1920.—Haulm stout, medium green; pods single, 4 inches, rather pointed, straight, dark green; 8 or 9 large bright green peas in a pod; very good flavour. Ready June 12. Raised by sender.

* * *

72. **S. T. WRIGHT** (Laxton), **A.M.** June 21, 1920.—Haulm similar to No. 54; pods single, 4½ inches, rather pointed, somewhat curved, medium green; 9 tightly packed large bright green peas in a pod; of good flavour; crop very good. Ready June 20. Raised by sender. Not yet in commerce.

(d) Over 4½ feet.

1. *Seeds round.*

84. **AMEER** (Kelway).—Haulm stout, medium green; height 5½ feet; pods in pairs, 3½ inches, rather blunt, curved, dark green, peas large, bright green, 9 or 10 in a pod; crop good. Ready June 20. Introduced by Messrs. Hurst.

* * *

63. **EARLY BOUNTIFUL** (Kelway).—Described in vol. xli. p. 283; height 5½ feet; pods in pairs; crop good. Ready June 20. Irregular in growth.

88. **BOUNTIFUL** (Sutton), **C.** June 21, 1920.—Characters as foregoing; crop good. Ready June 19. Raised by Messrs. Sutton.

* * *

59. **SKIPPER** (Laxton), **A.M.** June 21, 1920.—Haulm stout, light yellowish green; height 5 feet; pods mostly in pairs, 4 inches, rather pointed, straight, dark green; peas large, bright green, 8 rather mealy peas in a pod; crop very good. Ready June 12. Raised by sender. Not yet in commerce.

* * *

53. **FIRST FOOT** (W. G. Holmes).—Haulm stout, medium green; pods in pairs, 3½ inches, somewhat blunt, straight, medium green; peas of medium size, bright green, 9 to 10 in a pod, rather mealy; crop medium. Ready June 18. Raised by sender.

2. *Seeds wrinkled.*

71. **AVIATOR** (Laxton), **A.M.** June 21, 1920.—Haulm 5 feet, stout, pale yellowish green; pods single, 4 inches, pointed, curved, dark green; peas fairly sweet, large, bright green, 8 in a pod; crop good. Ready June 13. Raised by sender. Not quite true. Not yet in commerce.

* * *

73, 74. **ADMIRAL BEATTY** (Laxton, Nutting), **A.M.** June 21, 1920.—Haulm 5 feet, sturdy, medium green; pods in pairs, 4½ inches, rather blunt, curved, medium green; peas large, bright deep green, 8 or 9 in a pod, flavour sweet; crop very good. Ready June 20. Raised by Messrs. Laxton.

101. ROYAL STANDARD (Sowman), **H.C.** June 21, 1920.—Characters of Alderman type, but dwarfier, 5 feet; pods paired, $4\frac{1}{2}$ inches, somewhat pointed; peas bright green; crop good. Ready June 20.

* * *

114. DUKE OF ALBANY (Sutton), **A.M.** June 21, 1920.—Described in vol. xliii. p. 506; height 6 feet; pods in pairs; crop very good. Ready June 20.

* * *

112. EDWIN BECKETT (Nutting), **H.C.** June 21, 1920.—Haulm 5 feet, medium, medium green; pods in pairs, $4\frac{1}{2}$ inches, somewhat pointed, curved, dark green; peas large, bright green, 7 or 8 in a pod; crop good. Ready June 19. Raised by Mr. Edwin Beckett, introduced by Messrs. Cutbush.

* * *

82, 83. THOMAS LAXTON (Barr,† Nutting), **C.** June 11, 1920.—Described in vol. xli. p. 284; crop very good. Ready June 12. Raised by Messrs. Laxton.

† Not listed by this sender.

SECOND-EARLY POTATOS AT WISLEY, 1920.

EIGHTY-TWO stocks of potatoes were sent for the second-early potato trial at Wisley in 1920. Forty tubers of each were planted in rows three feet apart, twenty inches from plant to plant, twenty on one piece of ground which had not recently been manured, twenty on another which had a moderate dressing of pig manure. No artificials were used. Planting was done on April 21, and almost every stock made good and regular growth, the only exceptions being No. 21, 'The Duchess,' and No. 37, 'Lathom Queen,' both of which were too poor to describe. The weight of crop given is in each case the sum of the two lots of tubers.

The stocks were in almost every case free from rogues, but in one or two, even among those sent in as seedlings, rogues occurred.

Nos. 25, 'Seedling White Round' (crop 76 lb.); 43, 'Early Market' (C. Sept. 29, 1920; crop 124 lb.); 50, 'Early Puritan' (crop 92 lb.); 52, 'Glenkindie Early' (indistinguishable from 'Duke of York'; crop 112 lb.); 53, 'Seery's Surprise' (indistinguishable from 'Beauty of Hebron'; crop 102 lb.); 54, 'Early Sunrise' (indistinguishable from 'Early Rose'; crop 106 lb.); 58, 'Epicure' (crop 136 lb.); 59, 'Arran Rose' (crop 47 lb.); and 62, 'Seedling Coloured Round' (crop 53 lb.), belong to the early section. No. 32, 'Favourite' (crop 84 lb.), No. 34, 'Frankville Favourite' (A.M. Sept. 29, 1920; crop 153 lb.), No. 57, 'Ferncliffe' (crop 115 lb.), and No. 69, 'Gamekeeper' (crop 123 lb.), all forms of the 'Abundance' type; No. 38, 'Devon Hero' (crop 91 lb.), and No. 48, 'General Foch' (crop 197 lb.), belonging to the 'Up-to-date' type; No. 77, 'Tinwald Perfection' (crop 157 lb.); No. 78, 'Golden Wonder' (crop 82 lb.); No. 79, 'Kerr's Pink' (crop 189 lb.); No. 80, 'King Edward VII.' (crop 118 lb.); and No. 81, 'Lochar' (191 lb.) belong to the late section. These are not referred to again.

The Judging Committee selected the following for awards, taking into consideration the crop, general shape and appearance, freedom from disease, and the cooking quality of all the varieties. For descriptions and notes see p. 390:

Award of Merit:

Nos. 1-6, 74. 'Great Scot,' raised by Mr. Mair and sent out by Mr. McAlister (A.M. 1917).

7. 'Warwick Castle,' sent out by Messrs. Sutton.

17-20. 'Ally,' raised by Mr. McKelvie.

51. 'Di Vernon,' raised by Mr. Findlay.

Highly Commended:

8-11, 71. 'King George,' raised by Mr. Gardiner (A.M. 1917).

12-16. 'British Queen,' raised by Mr. Findlay (A.M. 1905).

46. 'Sir Edward Carson' ('British Queen' type), raised by Mr. Sands.

29. 'Berwick Castle,' sent out by Messrs. Sutton.

Commended:

33. 'Early Round,' sent out by Messrs. Laing and Mather.

63. 'K. of K. No. 2,' raised by Mr. Findlay.

Awards had previously been made to other second-early or early maincrop varieties represented in the trial (in addition to old awards mentioned above) as follows. These were passed over by the Committee on this occasion. No. 28, 'Stirling Castle,' **A.M.** 1915 (Sutton); No. 31, 'Windsor Castle,' **F.C.C.** 1893 (Sutton); and No. 49, 'Jeanie Deans,' **F.C.C.** 1893 (Carter).

We have grouped together the varieties in the trial which were most alike, following the plan commenced in vol. xliii. p. 137. The crop given represents the weight obtained from 40 tubers. The notes on disease refer to 'blight' due to *Phytophthora infestans*.

We have to acknowledge with grateful thanks the help rendered us by Messrs. Bone and Lasham in comparing the different varieties and arriving at conclusions regarding their identity.

DESCRIPTIONS.

(a) *Tubers kidney, white or yellow.*

1. Flowers white.

*42. EDINBURGH CASTLE (Sutton).—Described vol. xli. p. 298. Crop 148 lb. (Scotch seed). Badly attacked by blight.

* * *

40, 41, 70. MAJESTIC (Veitch, Dobbie, Carter).—Plant vigorous, dark grey-green; haulm 20 in., erect, medium green; foliage large, rough, dull; tubers large, flat kidney; skin yellowish, smooth; eyes small, shallow; flesh coarse-grained, pale lemon; somewhat waxy when cooked. Crop 205 lb., 201 lb., †116 lb. (Scotch). Free from blight. Raised by Mr. Findlay and introduced 1916. An early maincrop.

* * *

55, 56. NITHSDALE (McAlister, Veitch).—Plant vigorous, dark grey-green; haulm 24 in., fairly erect, medium green; foliage large, somewhat crumpled; tubers medium, flat kidney; skin yellowish, smooth; eyes large, shallow; flesh dull white; rather waxy when cooked; flavour good. Crop 131 lb. (Scotch). Diseased. Introduced by Mr. McAlister. An early maincrop.

2. Flowers drop in bud.

67. ROYAL KIDNEY (Barr).—Plant vigorous, dark yellowish green; haulm medium green, 24 in.; foliage fairly smooth, dull; tubers medium, rather variable in form; skin smooth, light brown; eyes large, shallow; flesh firm, pale lemon; when cooked rather mealy, but flavour poor. Crop 112 lb. (Lincs). Slightly diseased.

68. LANGHOLME MODEL (Findlay). Indistinguishable from the preceding. Crop 149 lb. (Scotch). Slightly diseased. Raised and introduced by Mr. Findlay.

(b) *Tubers kidney, coloured.*

1. Flowers white.

66. HONEYBROOK HUSTLER (Mennell).—Plant vigorous, dark grey-green; much resembles 'Mr. Bresse,' but flesh lemon, not tinged; when cooked fairly mealy, flavour fair. Crop 100 lb. (Irish). Long grown in Co. Kilkenny.

* See footnote, p. 359.

† Delivered late, planted without sprouting.

2. Flowers coloured.

51. **DI VERNON** (Findlay), **A.M.** Sept. 29, 1920.—Plant vigorous, very dark green; haulm 24 in., erect, dark green, tinged red at nodes; foliage large, flat; flowers dark mauve to purple; tubers medium to large, somewhat flattened, skin yellowish purple round eyes; eyes large, shallow; flesh pale lemon; when cooked fairly mealy and of good flavour. Crop 151 lb. (Scotch). Slightly diseased. Raised by Mr. Findlay; introduced 1920.

* * *

47. **GENERAL TOWNSEND** (Jewson).—Plant vigorous, dark green; haulm 24 inches, erect, medium green; flowers few, dark mauve; tubers mostly large, rather irregular; skin smooth, pale brown, with sometimes a pinkish flush, especially about eyes; flesh yellowish; fairly mealy and of fair flavour when cooked. Crop 135 lb. (Wisbech). Badly diseased. Raised by Mr. Findlay, and said to be a sport from 'K. of K.'; introduced by sender.

(c) *Tubers oval, white or yellow.*

1. Flowers white.

8-11, 71. **KING GEORGE** (Toogood, Sutton, Barr, Dobbie, Carter), **H.C.** Sept. 29, 1920.—Plant large, dark green; haulm 18 to 20 inches, rarely tinged; foliage almost smooth, dull; tubers medium to large; skin rough, light brown, often flushed pink at end; eyes medium, shallow; eyebrows conspicuous; flesh firm, dull white; when cooked firm, fairly mealy, dirty white, and of only fair flavour. Crop respectively 191 lb., 207 lb., 195 lb., 210 lb., †144 lb. (Scotch). Disease slight. Raised and introduced by Mr. Gardiner.

'King George' is immune from wart disease and 'British Queen' is not. The two varieties are very similar in growth, but the foliage and flower buds of 'King George' are paler than those of 'British Queen,' and 'King George' often flowers more freely.

* * *

12-15. **BRITISH QUEEN** (Toogood, Barr, Veitch, Dobbie), **H.C.** Sept. 29, 1920.—Described in vol. xli. p. 302. Fairly firm and mealy when cooked, creamy and of good flavour. Crop 207 lb., 199 lb., 186 lb., 220 lb. (Scotch). Practically free of disease. Raised (1884) and introduced (1894) by Mr. Findlay.

16. **BRITISH QUEEN** No. 2 (Findlay), **H.C.** Sept. 29, 1920.—Identical with foregoing. Crop 205 lb. (Scotch).

72. **ROYALTY** (Carter).—Indistinguishable from 'British Queen.' Crop †117 lb. Rather badly diseased.

46. **SIR EDWARD CARSON** (Sands), **H.C.** Sept. 29, 1920.—Described vol. xli. p. 301. Belongs to 'British Queen' type. Crop 182 lb. (Irish). Raised and introduced by Mr. Sands, 1915.

* * *

17-20. **ALLY** (W. G. Holmes, Dobbie, Veitch, Sutton), **A.M.** Sept. 29, 1920.—Plant large, grey-green; haulm 16 inches, dark green, large, rough, crumpled, dull; flowers many, anthers irregular; tubers large, flat oval; skin rough, light brown; eyes medium, rather shallow; flesh firm, dull white; when cooked somewhat soft, mealy, light yellow, flavour fair. Crop 213 lb., 209 lb., 211 lb., 200 lb. (Scotch). An early maincrop. Disease-free. Raised by Mr. McKelvie.

* * *

76. **NEW ZEALAND** (Martineau).—Plant large, erect, yellowish green; haulm 20 inches, medium green; foliage large, rough, dull; tubers medium, flat oval, but variable; skin rather rough, light yellowish; eyes large, shallow; flesh dull white; when cooked firm, waxy; flavour fair. Crop 108 lb. (Berks). Slightly diseased. Introduced by sender from New Zealand.

* * *

49. **JEANIE DEANS** (W. G. Holmes).—Described vol. xliii. p. 119. Crop 160 lb. (Scotch). Slightly diseased. Raised by Mr. Findlay.

2. Flowers coloured.

26. **BRAEMAR CASTLE** (Sutton).—Plant large, dark yellowish green; haulm 16 inches, medium green, tinged reddish brown; foliage large, rough, dull; flowers many, light mauve; tubers flattened, medium to large; skin rough,

† Delivered late, planted without sprouting.

light brown; eyes medium, shallow; flesh firm, pale lemon; rather waxy when cooked, pale yellow, flavour poor. Crop 168½ lb. Somewhat diseased. Raised by Rev. A. Paton; introduced by sender.

* * *

44, 45. BURNHOUSE BEAUTY (Dobbie, Veitch).—Described vol. xliii. p. 121. Crop 123 lb., 115 lb. (Scotch). Raised by Mr. Wolfe; introduced by Messrs. Dobbie. Slightly diseased.

(d) *Tubers round, coloured.*

Flowers drop in bud.

65. KATIE GLOVER (Findlay).—Plant similar to 'K. of K.', but foliage darker and shining; tubers medium to large, rather variable; skin smooth or rough, yellowish; eyes large, shallow, reddish pink; eyebrows reddish pink; flesh firm, very pale lemon; when cooked somewhat waxy, dull white; flavour fair. Crop 136 lb. (Scotch). Very slightly diseased. Raised and introduced by Mr. Findlay.

(e) *Tubers oval, coloured.*

Flowers none.

63. K. OF K. No. 2 (Findlay), C. Sept. 29, 1920.—Plant large, medium yellow green; haulm 20 inches, dark green; foliage large, rough, dull; tubers medium to large, flat oval, but variable; skin rather rough, yellowish, streaked and mottled with reddish pink especially towards rose end; eyes large, shallow, reddish pink; flesh firm, pale lemon; rather watery when cooked; flavour fair. Crop 127½ lb. (Scotch). Slightly diseased. Raised by Mr. Findlay.

64. K. OF K., No. 3 (Findlay).—Like preceding, but colour on tubers not quite so pronounced. Crop 127 lb.

(f) *Tubers round or flat round, white or yellow.*

1. Flowers white.

1-6, 74. GREAT SCOT (Sutton, Barr, W. G. Holmes, R. Veitch, Dobbie, Toogood, Carter), A.M. Sept. 29, 1920.—Described vol. xliii. p. 140. Crops respectively 218½ lb., 188½ lb., 189 lb., 193½ lb., 194½ lb., 199 lb., †120 lb. (Scotch seed). Disease very slight. An early maincrop. Raised by Mr. Mair, of Lockerbie; introduced by Mr. McAlister.

* * *

22-24, 73, 82. ARRAN COMRADE (Sutton, Veitch, Dobbie, Carter, McAlister).—Plant vigorous, dark green; haulm 18-24 inches, medium green, erect; foliage large, rough, dull, flat; flowers many, anthers orange; tubers medium, flattish round; skin fairly smooth, light brown; eyes medium, slightly sunken; flesh firm, pale lemon; when cooked fairly mealy, yellowish; flavour fairly good. Crop 189 lb., 158½ lb., 183 lb., 127 lb., †138½ lb. (Scotch). Slightly diseased. Raised by Mr. McKelvie.

* * *

27. MONTANA (Irish Bd. Agr.).—Plant vigorous, dark yellowish green; haulm 18 inches, medium green; foliage large, slightly crumpled, dull; flowers many, medium; tubers medium to large, flat round; skin variable, yellowish; eyes medium, shallow; flesh firm, dull white; mealy, white when cooked; flavour fair. Crop 105 lb. (Irish). Badly diseased. Introduced from America. An early maincrop. Subject to winter rot.

* * *

35. CULTS (Guthrie).—Plant vigorous, very dark green; haulm 18 inches, dark green, slightly tinged brown; foliage large, rough, rather dull; tubers medium, regular; skin roughish, light brown; eyes deep; flesh firm, coarse-grained; when cooked firm, mealy, dull white; flavour poor. Crop 154 lb. (Scotch). Tubers badly diseased. A cross between 'Rector' and 'Great Scot'; raised by Messrs. Guthrie.

2. Flowers coloured.

31. WINDSOR CASTLE (Barr).—Plant of medium vigour, dark green, rather spreading; haulm 16 inches; foliage rough, shining, medium green, tinged brown; flowers medium lilac; tubers medium to large; skin smooth, white; eyes

† Delivered late, planted without sprouting.

rather large, little sunken; flesh yellowish; when cooked firm, rather waxy, creamy; flavour poor. Crop 96 lb. (Norfolk). Somewhat diseased.

[No. 30 was sent in as 'Windsor Castle' (Toogood), but proved to be a mixed stock, mainly 'Up-to-Date'.]

* * *

33. MEIN'S EARLY ROUND (Laing and Mather), C. Sept. 29, 1920.—Plant very vigorous, fairly erect, dark green; haulm 30 inches, medium green, slightly tinged brown; foliage large, rough; flowers many, dark mauve, tipped white; tubers large, round; skin medium, light brown; eyes large, shallow, with a pinkish flush; flesh firm, dull white; when cooked firm, somewhat mealy, white; flavour poor. Crop 156 lb. (Scotch). Slightly diseased. Also known as 'Smailholm Early.'

* * *

36. CONQUEST (Findlay).—Described vol. xliii. p. 118. Flowers tinged pale lilac when first open. Crop 116 lb. (Scotch). Tubers badly diseased.

3. Flowers drop in bud.

7. WARWICK CASTLE (Sutton), A.M. Sept. 29, 1920.—Described vol. xli. p. 303. Crop 177 lb. (Scotch). Creamy when cooked, fairly mealy and of fair flavour. Little disease. Raised by Rev. A. Paton. Introduced by Messrs. Sutton.

* * *

28. STIRLING CASTLE (Sutton).—Described vol. xli. p. 303. Flesh when cooked firm, somewhat mealy, creamy; flavour fair. Crop 159 lb. Somewhat diseased. Raised by Rev. A. Paton; introduced by sender.

* * *

29. BERWICK CASTLE (Sutton), H.C. Sept. 29, 1920.—Plant large, dark yellowish green; haulm 18 inches, fairly erect, tinged reddish brown; foliage large, rough, dull; flowers few, dropping in bud; tubers large to medium; skin rather rough, yellowish; eyes medium, shallow; flesh firm, dull white; when cooked rather waxy, flavour rather soapy. Crop 162 lb. (Scotch). Badly diseased.

(g) Tubers round, coloured.

1. Flowers white.

39. GUTHRIE'S 75's (Guthrie).—Plant vigorous, green; haulm 20 inches, erect, tinged; foliage somewhat rough and shining; flowers creamy; tubers medium, somewhat flattened, fairly regular; skin rather rough, yellowish ground much tinged with pink; eyes large, shallow; flesh coarse-grained, pale lemon; when cooked fairly mealy; flavour fair. Crop 200 lb. (Scotch). Badly attacked by disease. Raised by sender.

* * *

60, 75. EDZELL BLUE (Veitch, Carter).—Included vol. xlv. p. 367, among first early varieties but really a second early. Described vol. xliii. p. 118. Crop 132 lb., 100 lb.† (Scotch). Slightly diseased.

2. Flowers coloured.

61. EIGHTYFOLD (Findlay).—Included with first earlies, vol. xlv. p. 367, but really a second early. Crop 97 lb. (Scotch). Slightly diseased.

† Received late, planted without sprouting.

PARSLEY AT WISLEY, 1919 AND 1920.

FORTY-THREE stocks of Parsley were received for trial in 1919. All the seed was sown on land which had carried a crop of marrows in 1918, on April 24 in drills eighteen inches apart, three rows of each stock being sown. The plants were singled in June to four inches apart. The trial was continued into 1920 to see whether any difference was apparent in hardness or in time of starting in spring, but the winter was too mild to make the attempted comparison of any value. All stocks alike commenced to grow away well in 1920 at the same time.

The trial was examined on several occasions, and the Committee attached considerable importance to the deep green of some varieties, since these remain fresh-looking longer after picking, to the length of the stalk which makes picking easier, as well as to the general appearance of the plants, the yield of leaves and trueness to type.

They made the following recommendations for Award :

First-class Certificate.

27. Perennial Moss Curled, introduced and sent by Messrs. Watkins & Simpson.

Award of Merit.

- | | |
|--|---------------------------------------|
| 35. Perfection Moss Curled, introduced and sent by Messrs. Barr. | } Indistinguishable from one another. |
| 36. Imperial Curled, sent by Messrs. Barr. | |
| 43. Moss Curled, sent by Messrs. Nutting [A.M. 1908 (Nutting)]. | |

Highly Commended.

5. Fern-leaved Extra Curled, introduced and sent by Messrs. Watkins & Simpson.
7. Fern-leaved, sent by Messrs. Barr.

The following, which had received Awards in previous years, were passed over by the Committee :

9. Covent Garden [F.C.C. 1870 (Carter)] ; 13. Myatt's Extra Fine Garnishing [A.M. 1908 (Barr)] ; 15, 16. Emerald Green [A.M. 1908 (Carter)] ; 17, 18. Dwarf Perfection [A.M. 1908 (Sutton, Carter, Massey)].

Four stocks which were untrue to type, viz. Nos. 17, 18, 41, 42, are omitted.

DESCRIPTIONS.

Turnip-rooted varieties (the roots of which are cooked).

*1. SHORT TURNIP-ROOTED (Barr).—Leaves dull dark green ; roots long, square-shouldered, tapering. Ready September 1.

* * *

2. LONG TURNIP-ROOTED (Barr).—Leaves dull dark green ; roots long, cylindrical. Ready September 1.

* See footnote, p. 359.

Leaves moss-curved.

20. EXHIBITION (Watkins & Simpson).—Plant of medium height; leaves bright emerald green; stalks of medium length. Crop fair.

* * *

43. MOSS CURLED (Nutting), **A.M.** August 7, 1919.—Plant of medium height; leaves bright to dull emerald green; stalks of medium length. Crop good.

* * *

27. PERENNIAL MOSS CURLED (Watkins & Simpson), **F.C.C.** August 7, 1919.—Plant dwarf; leaves dull emerald green; stalks of medium length. Crop good. Introduced by sender. A very fine stock.

* * *

34. CHAMPION MOSS CURLED (Dobbie).—Plant dwarf; leaves dark dull emerald green; stalk of medium length; uneven in growth. Crop good. Raised and introduced by sender.

Leaves double curled (less curled than foregoing).

23, 24. CRESTED GEM (Kelway, Simpson).—Plant tall; No. 23 not true. Crop good. Raised and introduced by Messrs. Kelway.

* * *

25, 26. CRESTED BOUQUET (Carter, Barr).—Plant of medium height; darker green than 'Crested Gem'; somewhat uneven in curl. Raised by Messrs. Daniels, introduced by Messrs. Carter.

* * *

19. COMPACTUM (Carter).—Very similar to 'Crested Bouquet,' but taller in growth. Raised by sender.

* * *

28, 29. PERPETUAL (Carter, Barr).—Plant tall; a darker shade of green than 'Crested Bouquet.' No. 28 uneven in curl. Raised and introduced by Messrs. Carter.

30. THE HAWLMARK CURL (A. Dickson).—Characters as for 'Perpetual.'

* * *

35. PERFECTION MOSS CURLED (Barr), **A.M.** August 7, 1919.—Plant tall; leaves bright to dull emerald green; stalk of medium length. Crop good. Introduced by sender.

36. IMPERIAL CURLED (Barr), **A.M.** August 7, 1919.—Characters as foregoing.

* * *

39. SPLENDID CURLED (R. Veitch).—Very similar to No. 35, but a darker shade of green.

40. EXTRA LARGE CURLED (Carter).—Characters as foregoing; stock not true. Introduced by sender.

* * *

22. UNIQUE (Simpson).—Plant tall; leaves of a glaucous green; stalks long. Crop good. Stock not true.

* * *

9. COVENT GARDEN (Carter).—Plant of medium height; stalks of medium length. Crop good. Raised and introduced by sender.

* * *

11. MYATT'S GARNISHING (R. Veitch) }
12. EXQUISITE GARNISHING (Webb) } —Plant tall; of a rather darker green than No. 9; stalks of medium length. Crop good.

* * *

14. QUEEN OF THE PARSLEYS (Barr).—Very similar to foregoing, but taller in growth. Introduced by Messrs. Daniels.

* * *

13. MYATT'S EXTRA FINE GARNISHING (Barr).—Of a darker shade of green than No. 14, and not so coarse. Raised and introduced by Messrs. Myatt.

* * *

21. EXHIBITION (Dobbie).—Plant dwarf; stalks of medium length. Distinct from No. 20. Raised and introduced by sender.

* * *

31. MOSSY CURLED (Sydenham).—Plant of medium height; stock not true; varies in shade.

32, 33. CHAMPION MOSS CURLED (Thorburn, Carter).—Plant tall; leaves dark emerald green; stalks of medium length. No. 32 an uneven stock. Raised and introduced by Messrs. Carter.

* * *

37. IMPERIAL (Sutton).—Plant tall; leaves somewhat darker than Nos. 32, 33, and more curled. Raised and introduced by sender.

* * *

38. EXTRA CURLED (Dickson & Robinson).—Very similar to No. 37, but of a darker green, and not so much curled.

* * *

15, 16. EMERALD GREEN (Barr, Carter).—Plant of medium height; leaves dark dull emerald green; stalks of medium length. Crop good. Raised by Messrs. Moss, introduced by Messrs. Carter.

Leaves fern-leaved.

Bright emerald green.

5. FERN-LEAVED EXTRA CURLED (Watkins & Simpson), H.C. August 7, 1919.—Plant tall, leaves finely cut, close; stalk of medium length. Crop good. Introduced by sender.

6, 8. FERN-LEAVED (Carter, R. Veitch).—Characters as foregoing; No. 6, leaves somewhat coarser. Raised and introduced by Messrs. Carter.

7. FERN-LEAVED (Barr), H.C. August 7, 1919.—Similar to No. 5. A good stock.

Dull emerald green.

10. SELECTED GARNISHING (Sutton).—Plant tall; leaves finely cut; stalk of medium length. Crop good. Raised and introduced by sender.

Leaves plain.

3. PLAIN OR SHEEP'S (Carter) } —Plant tall; leaves dark dull green; stalks
4. PLAIN-LEAVED (Barr) } long. Crop good.

BOOK REVIEWS.

"A Guide to the Identification of our more Useful Timbers: being a Manual for the Use of Students of Forestry." By Herbert Stone. 8vo. 52 pp. (University Press, Cambridge, 1920.) 7s. 6d. net.

The introductory note with reference to the differences between coniferous and broad-leaved trees, and how best to go about the work of identification, is clearly stated and of great value, while the few sections illustrated, which we could have wished for a greater extension of, will help considerably in elucidating the text. Though mainly intended as a manual for the use of students of forestry, Mr. Stone's carefully compiled work, which extends to some fifty pages, with a dozen well-executed illustrations, will no doubt appeal to the more scientifically inclined foresters and woodmen.

"The Trees, Shrubs, and Plants of Virgil." By John Sargeant. (B. H. Blackwell, Oxford, 1920.) 6s. net.

A pleasant and scholarly little book, giving a list in alphabetical order of the generic names of plants mentioned by Virgil.

The essential portions of the lines in which they occur are quoted, and where possible the name used by the poet is identified with its modern botanical equivalent. Then follows a short account of the old-time lore and legend of the plant, and references to its mention in the works of other classical writers. This part of the work is so well done, and so evidently the outcome of considerable study, that it is a pity that some of the facts concerning the plants themselves are not equally accurate.

The writer tells us he has grown many of them, but his garden evidently does not include the Butcher's Broom or he would surely never have written that it dies down every year. It is strange to find hashish, which is made from hemp, spoken of as obtained from the capsules of the Opium Poppy.

It would be more correct to state that the Saffron extends from Kurdistan to the Mediterranean as a *cultivated*, instead of as a *native* plant, and again the large purple Crocuses of our gardens are derived from *C. vernus* and not, as stated, from *C. versicolor*.

Chives, *Allium Schoenoprasum*, grows wild in France, Spain, and Portugal, though here denied a Continental station in Western Europe. There is, however, so much that is interesting and informative to be found that these and a few other inaccuracies may be forgiven, and we hope will be amended in a future edition.

"The Practical Book of Outdoor Rose Growing for the Home Garden." By George C. Thomas, Jr. 8vo. 224 pp. (Lippincott, Philadelphia and London, 1920.) Garden Edition, 12s. 6d.; Edition de Luxe, with a greater number of illustrations, 30s.

Previous editions of this book appeared in 1914, 1915, and 1916, and the present "Garden" Edition has added to it, after the index, a chapter of some half-dozen pages on rose development from 1917 to 1920. The writer considers that the new American law restricting the importation of plants should be of benefit to American outdoor rose-lovers by stimulating the production of American roses, causing more roses to be propagated on suitable stocks and keeping both suitable and unsuitable foreign varieties from being imported on unsuitable stocks.

The stocks chiefly used in America are much the same as with us, save, perhaps, that they are somewhat fonder of *R. multiflora* as a stock, and it appears from the author's pages that the roses we find the best in this country usually bear a similar character across the water. It seems therefore a little difficult to follow how the American purchaser of rose plants will really benefit as he suggests.

He reviews some score of hybrid teas, teas, and hybrid musks, which do not find a place in the body of his work, though some of them (*e.g.* 'Peace,' 1903) are of some standing. He also gives a recipe for the prevention of black spot, consisting in treating the beds with sulphate of iron in autumn, spraying weekly with ammoniacal carbonate of copper till after the first bloom is finished and

thereafter every three weeks with Bordeaux mixture, and removal of all affected foliage.

The body of the book contains the usual directions for cultivation and propagation, and about half the letterpress is taken up with short descriptions of varieties and of the author's endeavour to test their value for garden purposes in various ways. Amongst others he gives his observations on the number of flowers produced per plant of the different varieties.

The Garden Edition of the work contains sixteen colour photographs and rather more than twice as many half-tone plates. The Edition de Luxe contains the same half-tone plates and no less than ninety-six colour photographs. If we may judge from the latter, it would appear that the full roses, usually called exhibition roses in this country, are apt to come rather thinner in the part of America where the roses illustrated were grown. Doubtless this may be caused by the greater extremes of heat and cold to which the plants are there subjected.

The book bears evidence of having been prepared with considerable care, and the author's attempt to put a flower value on the different varieties by estimating the average number of blooms produced per plant will no doubt be read with interest by many in this country.

Some observers who contribute to the "American Rose Annual" are making similar records, but, as the observations at present seem to be made on a comparatively small number of plants, it is not surprising that their results show discrepancy in detail. If these records are continued no doubt the results will tend to approximate and may prove valuable.

In reviewing the different varieties Captain Thomas often recommends that a particular variety should be grown in a special bed, but he gives very little indication how such special bed should be prepared. The advice, therefore, is not of much assistance to the grower.

"Keys to the Orders of Insects." F. Balfour-Browne, M.A. 8vo. 58 pp. (University Press, Cambridge, 1920.) 7s. 6d.

This useful and much-needed book is compiled for students with the idea of facilitating the "running down" of insects.

As each authority has a different method of classification, it follows that one has to learn each time the particular author's method; but this is done away with in the present book.

The pages are interleaved with blanks for notes. The author has followed Lefroy in recognizing twenty Orders, of which only six are fully dealt with.

A key is given to the Orders of Insects, founded on Comstock's and Lefroy's classifications.

With the help of letters, the key is readily understood and the method simple. Then follow keys to the Orders Orthoptera, Rhynchota, Lepidoptera, Coleoptera, Diptera, and Hymenoptera.

Sketches illustrating wing venation are given.

"The Garden Doctor: Plants in Health and Disease." By F. J. Chittenden. 8vo. x + 154 pp. (Country Life Library, London, 1920.) 7s. 6d. net.

The "Garden Doctor" is intended for the amateur or gardener who is closely and intelligently watching and observing the plants in his garden, and who wishes to understand and to appreciate the causes and effects of the many fungus, insect, or other diseases and pests to which he notices his plants are liable, and who is willing to take some little trouble to promote their cure.

Many amateurs who proclaim their fondness for a garden and for plants treat the whole subject of their well-being in a very flippant and dilettante way, and far too many so-called gardeners have no real desire for any further knowledge than that their great grandfathers have handed down to them, and simply scorn the results of scientific investigation. To such as these the "Garden Doctor" will obviously be of little use, for they either will not read it or will refuse to be guided by it. But to the really keen amateur or gardener who wants to be taught and to get behind the outward show of things, and learn the cause and the effect and cure, this book will be invaluable.

From cover to cover it is packed full of the results of close observation and experiment, and gives thoroughly practical common-sense advice arising therefrom. The "Doctor" does not pretend that he can cure every trouble and disease, but even in the most difficult cases suggests how the disease is most likely to be avoided.

The writing is unusually concise, particularly in the first two chapters, so that every sentence demands, as it so well deserves, the closest attention and thought.

There are chapters on fungus diseases, with an alphabetical list of all the

more usual garden plants, together with the symptoms and treatment of the ills by which each plant is known to be attacked.

Insect attacks are also described, together with the best means of warding against them, which is the better way; or of combating them when present.

There is also, we are glad to notice, a chapter on Insect Friends—hitherto a very neglected subject, and one on which the most profound ignorance prevails. The wholesale and indiscriminating massacre of insects by gardeners cannot be too strongly condemned, as witness the case of an amateur who, after killing hundreds of ladybirds last summer, sent a few to the writer, asking if it had not been right to do so! One sentence in this chapter we must quote, as it is such an excellent illustration of the thoroughly practical common-sense observation of the "Garden Doctor": "Insects provided with long legs, and (or) powerful wings, large eyes, and conspicuous jaws, are unlikely to feed mainly on plants. They are equipped with the implements of the hunter; and the soil abounds in such."

"Conifers and their Characteristics." By C. Coltman Rogers. 8vo. xiii + 333 pp. (Murray, London, 1920.) 21s. net.

The author sets out with the laudable purpose of giving in small compass the means of identifying the coniferous trees of our gardens and parks, and some information about them. The former aim is accomplished by analytical tables on pages 263 to 305, the latter takes the remainder of the book. The amount of the information given is, however, by no means commensurate with the space occupied.

The exact meaning of some of the notes in the analytical tables is doubtful. For instance, the male flowers of *Tsuga* are said to be "on axils" (p. 283), and on the same page *T. Brunoniana* is said to have "bright white thick stomata effect on under surface" of leaves. For the rest perhaps the "legend" of fig. 4, opposite p. 159, may be regarded as typical. There two small photographs of apparently the same cone-bearing twig of *Libocedrus decurrens* are printed, and the description runs, "Libocedrus decurrens, also Libocedrus decurrens." A certain fanciful wit, but often expressed in inverted sentences, and in words used in a sense often etymologically exact but in these days having a special application different from that given here, characterizes the book all through, and one does not feel behind it the authority of those masters, Elwes and Henry and Bean, who have so recently given us of their best. Nevertheless there is much in this book to interest the amateur tree-lover.

"A Garden Flora: Trees and flowers grown in the gardens at Nymans." By L. Messel. 8vo. xi + 196 pp. (*Country Life*, London, 1918.) 10s. 6d. net.

Lists of plants cultivated in an enthusiast's garden have always a value for others, and when that enthusiast also has courage to attempt what most have hesitated to embark upon, the record of his successes or partial successes gives an impetus to his neighbours, and encourages them to adventure further, and to add fresh experience to the increasing sum of it which has so enriched our gardens and our gardening.

Miss Messel, with the help of others, Mr. Bean, Mr. J. Nix, Mr. Alfred Parsons, and Mr. Comber, the enthusiastic gardener in charge of the collection, men whose competence none can dispute, has produced a very valuable record of what can be done by perseverance, courage, and skill in Sussex, and we commend that record to plant-lovers the country through.

"The Garden that We Made." By the Crown Princess of Sweden. Large 8vo. 72 pp. (The Religious Tract Society, London, 1920.) 10s. 6d.

This is an exceedingly interesting book, and, although the Royal authoress evidently considered it more suited for beginners than for experienced gardeners, there is much that is worthy of deep consideration by even the most skilful readers. We were specially attracted by the chapter on "Making a Rock Garden," which is so full of valuable advice and suggestions that it should be carefully read and studied by all who are thinking of adding this fascinating part of the garden to the existing. Everyone will agree that the rock garden should harmonize with its surroundings; unfortunately, this is not always the case, and the most unsuitable places are often selected, with the result that, instead of being one of the most charming parts of the garden, it is uninteresting, and in some places positively ugly, and avoided by visitors.

The advice given by Her Royal Highness indicates clearly how all this unsightliness can be avoided, and a delightful place made instead. Equally attractive is the chapter on water gardens. Some illustrations show admirably how they should be made, and how beautiful natural effects, very varied in character, can be obtained, and the finest effects secured by judicious planting, using the most adaptable plants in masses, thus getting bold results, which cannot be secured by dotting one or two plants of each, except, as shown in one of the illustrations, with Gunnera, which is too massive for large groups, unless in very large places. All the book is well done and clearly written, and we feel that this eminent lady's death is a great loss to landscape gardening, as well as to other walks of life. The book is well printed, admirably illustrated, and completed with a capital index.

"The Calendar of Garden Operations." By the "Gardeners' Chronicle" Staff. 8vo. 119 pp. ("Gardeners' Chronicle," London, 1920.) Price 2s.

This is a new and enlarged edition of a well-known and popular work, comprising a mass of exceedingly serviceable information well printed, and most useful to all having a garden.

"Our Orchards." By the Rev. R. Abbay. 35 pp. (Ipswich, 1920.) Price 1s.

This is a little booklet of letters written by Mr. Abbay, from 1892-1920, that were printed in the "East Anglian Daily Times," with notes. These letters are full of most instructive observations of a keen fruit-grower that will be of much interest to other growers.

"Everybody's Book of Garden Annuals." By H. Greaves, F.L.S. 136 pp. (Holden & Hardingham, London, 1920.) Price 1s. net.

In these days when all are reducing garden expenses to the lowest limit, and trying to keep the garden gay at the lowest cost, this book will appeal, showing what to grow, and bringing annuals to the fore in a pleasing manner, and will, we hope, induce more to grow these beautiful and easily-grown flowers. It is a matter of regret that the book is not indexed.

"Manual of American Grape Growing." By U. P. Hedrick, and edited by L. H. Bailey. 8vo. 458 pp. (Macmillan, New York, 1919.) Price \$2.50.

The title of this excellent book shows that it is meant for American readers; at the same time the British grape-grower will find a great deal of information of service. The book is admirably got up, illustrated beautifully and instructively, showing among other things the diseases which attack grapes.

"Twentieth Century Potatoes." By J. Fraser, F.L.S. 8vo. 72 pp. (Cable Publ. Co., London [1920].) 3s. net.

This list of potatoes with descriptions will make a useful handbook for reference. Most of the very large number of names applied to potatoes during the past few years are listed and the characters of plant and tuber described in more or less detail. We hope that an attempt will be made at classifying the varieties mentioned, so as to make the list even more valuable than it now is.

"The Nursery Manual." By L. H. Bailey. Ed. 22. 8vo. 456 pp. (Macmillan, New York. 1920.) 13s. net.

This exceedingly valuable and instructive work has been reviewed so many times before in these pages that it is rather difficult to say anything fresh on its excellence and general usefulness. Like all Mr. Bailey's works, it is thoroughly up to date, and contains a mass of sound information on the propagation and raising of nursery stock. As in the previous editions, the instructions are so clearly given that anyone may easily follow them. Nearly all the information is equally as suitable for this country as it is for American readers. Like the former editions, the book is well illustrated and well indexed.

"The Planning and Planting of Little Gardens." By George Dillistone. 8vo. 134 pp. (*Country Life*, London, 1920.) 6s. net.

There is one paragraph in this work which is very true and seldom remembered in planning out the residence of a person of small means, viz., "If there is one thing more than another necessary to make an Englishman's house his *home* it is a garden." The author has clearly indicated in this book how the garden can be developed, in almost all instances, at a comparatively small

cost. Some years ago *The Garden* promoted a garden-planning competition principally for small gardens, many of which are shown in this capital book. It indicates what to encourage and what to avoid, thus having the whole place in pleasant harmony, and yet everything serving its purpose in the scheme. Numbers of people will be astonished at the little-grown plants of great beauty that can be admirably cultivated in quite small gardens, and the joy they will give to the owner if they get the best of everything and grow them well, the original cost being no greater than if inferior things were put in. The whole book is well got up, the illustrations are excellent, and the printing good.

"Practical Hardy Fruit Culture." By Richard Staward. 8vo. 216 pp. (Strathmore Press, London. 1920.) 6s. net.

This book contains a mass of sound information very serviceable for growers of hardy fruits. We do not agree with all the writer advocates; for instance, he would plant apples on walls, if on Paradise stocks, at twelve feet apart; if on the free stock at twelve to fifteen feet apart; bush trees on the Paradise stock from six to nine feet apart; and standard apples at twelve feet apart, which is much too close for even compact-growing varieties; spreading varieties would soon be matted together, unless continually root-pruned to keep them in bounds. In a future edition these and a few other mistakes may be remedied, but, taken altogether, the book is well printed, nicely illustrated, and contains a great deal of serviceable information. There is no index.

"Practical Amateur Gardening." By H. H. Thomas. 276 pp. 8vo. (Cassell, London. 1920.) 8s. net.

All Mr. Thomas puts his pen to is well done, and this work of his is not an exception; in fact, we consider it one of his best books. In his preface he says he hopes that the "Practical Amateur Gardening" will become the guide, philosopher, and friend of amateur gardeners generally, and we think his hopes will be fulfilled. There is scarcely any branch of gardening that is not admirably treated upon, and although there is a great number of books published now on gardening subjects, there is ample room for this one, and we have no hesitation in recommending all who do not possess it to purchase this one, and then read, mark, learn, and inwardly digest it. A very good index finishes the book.

I. "Some Familiar Wild Flowers." II. "Australian Wild Flowers." By A. E. Sulman. 8vo. (Angus & Robertson, Sydney [1919].) 1s. each net.

Two series of excellent reproductions from photographs of Australian wild plants, admirably illustrating the singularity of the Australian flora and giving, in spite of the lack of colour, some idea of its beauty. The first contains representations of sixty, the second of fifty-five different plants. There is no letter-press.

"Meteorology for All: being some weather problems explained." By D. W. Horner. 8vo. xvi + 184 pp. (Witherby, London, 1919.)

"Elgie's Weather Book for the General Reader." By J. H. Elgie. 8vo. xii + 251 pp. (Wireless Press, London, 1920.) 5s. net.

The first of these books is largely concerned with descriptions of meteorological instruments and their use, the second with the popular explanation of various weather phenomena, and both with the desire to put before the general reader an account of the methods by which weather forecasts are arrived at and the causes of weather. Both succeed admirably in their several ways, and tell all that need be told until the day comes when we may bend even the forces that produce our weather to our will.

"Home and Farm Food Preservation." By W. V. Cruess. 8vo. xxiv + 276 pp. (Macmillan, New York, 1918.) 8s. net.

Written for American readers and conditions, parts of this book are likely to prove useful to English readers. Careful and explicit directions are given for all the processes of drying and sterilizing fruit and vegetables, but recipes for jam and jelly making are but cursorily dealt with.

"The Culture of the Chrysanthemum." By W. Wells. 112 pp. (Country Life, London.) 2s. 6d. net.

We question if any book on chrysanthemums has been so widely read or has run into so many editions as this, the latest edition being brought up to date (1920) by the son of the author, Mr. Harold Wells. Needless to state, it is

admirably done, well maintaining its reputation not only for excellence of matter, but for clearness, sound practice, good printing, and capital index.

"Cultivation with Movable Frames." By Herbert Cowley. 32 pp. (Country Life, London, 1920.) 9d. net.

A very little booklet that will easily go in one's pocket, and that will fill a useful want for cottagers, small holders, and others with a limited income who are anxious to get all the produce they can without very much outlay. An excellent calendar of work for each month is given, the whole being well printed and indexed.

"Productive Small Fruit Culture." By F. C. Sears, M.S. 8vo. 368 pp. (Lippincott, Philadelphia and London, 1920.) 10s. 6d. net.

This book was written principally for American readers, and some of the matter, such as grape-growing in the open, would be valueless for British readers; but apart from that, there is a vast amount of really good information that is valuable to the British fruit-grower and which he will be wise to read and study carefully. Not only is one told in the best and most attractive manner how to produce the heaviest and best crops, but the best system of manuring is specially dealt with, and the various fungus and insect pests are treated in a masterly style, and yet in such a simple way as will be quickly and easily understood.

"The Rock-Garden." By E. H. Jenkins. 8vo. 128 pp. (Country Life, London, 1920.) 7s. 6d. net.

We believe an early edition was first published as "The Small Rock-Garden" in 1913, and this is a new edition revised, enlarged, and brought up to date. This book is especially welcome in these days, as few can afford the labour, expense of fuel, &c., of maintaining glass erections, and fall back on the more natural conditions supplied by outdoor gardening in the form of rock-gardens, including moraines, water-gardens, and bog-gardens. On all sides we find that this fascinating style of gardening is much in evidence, and all who have an idea of adopting it should read Mr. Jenkins' book, which is full of interest, sound advice and clear instruction, beautifully illustrated and well printed.

"The Perpetual Carnation." Illustrated. By Laurence J. Cook. 8vo. 108 pp. ("Country Life," London, 1920.) 2s. 6d. net.

In this latest edition Mr. Cook has not only retained all the essential features of the former popular editions, but has brought all the matter up to date in his pleasing and instructive manner. We can heartily commend this book to all who cultivate this favourite flower.

"Profitable Fruit-Growing." By John Wright, V.M.H. 8vo. 132 pp. (Collingridge, London, 1920.) 2s. net.

The mere fact that this first-rate book has run into the eleventh edition is excellent proof of how much read and popular it is amongst all fruit-growers in a large or small way. The present edition has been revised and brought up to date by the late author's son Walter, and, needless to state, in such able hands it has been well done.

"A Course of Practical Chemistry for Agricultural Students." Volume I. By L. F. Newman and H. A. D. Neville. Demy 8vo. 235 pp. (The University Press, Cambridge, 1920.) 10s. 6d. net.

The first part of Volume II. of this Course has already received our notice (R.H.S. JOURNAL, XLV. p. 379). The book now under review covers the first year's course on the chemistry and physics of the soil, and on the whole it presents the subject in a successful and attractive fashion. It is designed for the use of students having no previous knowledge of chemistry or physics and therefore it is inevitable that the treatment of these subjects in so small a volume must be rather condensed and eclectic, but admitting this limitation it must be stated that the subject-matter is well arranged and lucidly explained. Our quarrel, if any, must be, not with the authors, but with the University of Cambridge, that apparently demands so scanty a groundwork in natural science from candidates for its Degree in Agricultural Science.

The book is well printed and practically free from typographical errors. Of its 235 pages, 102 are blank for students' notes. That so small an amount of letterpress should bring the price of the book to half-a-guinea is an indication of the lamentably increased cost of book-production, or of the opulence of the Cambridge undergraduate.

"Chemical Fertilizers and Parasitocides." By S. Hoare Collins. Demy 8vo. xii + 273 pp., 9 figs. (Baillière, Tindall & Cox, London, 1920.) 10s. 6d. net.

This volume, which appears in the series on Industrial Chemistry edited by Dr. Rideal, is a companion to the volume by the same author on "Plant Products" already noticed in this JOURNAL (Vol. XLIV. p. 133). In the former volume the author treated of chemical fertilizers from the point of view of crop increment, whereas in that now under notice they are dealt with primarily with reference to their sources and modes of manufacture.

An admirably readable and complete account of the subject is given, together with plentiful references to the literature. Altogether the volume should prove of great value to the technical fertilizer chemist and to the scientific agri- or horti-culturist; it successfully fills what has long been a noticeable gap in the literature of industrial chemistry.

"Lawns." By Messrs. Sutton & Sons. Ed. 13. 8vo. 79 pp. (Sutton, Reading.) 2s. 6d. net.

Perhaps no part of the garden gives more trouble than the lawn, and this often because it has been started on wrong lines and attended to without due consideration of its needs. If the clear directions given in this little book are followed exactly, those who have the care of lawns for any purpose whatever will be able to avoid much of the worry and disappointment that waylay their steps at present. We can heartily commend it.

"Horticulture: a Textbook for High Schools and Normals." By K. C. Davis. 8vo. vii + 416 pp. (Lippincott, London.) 8s. 6d. net.

This volume is a course of instruction in horticulture for teachers in training and for scholars in high schools and is intended to be a part of the ordinary school or training college course, *i.e.* part of the general education. It is written for American scholars and teachers, and is thus not entirely suited for use as a textbook on this side of the Atlantic. The book is nevertheless one to which we would like to draw attention, because of its value in suggestion to teachers here in the framing of courses of instruction. Methods of instruction and types of exercises which scholars may reasonably be expected to perform will find many useful illustrations in this complete and able book.

"Injurious Insects and Useful Birds." By F. L. Washburn, M.A. 8vo. xviii + 453 pp. (J. P. Lippincott, London.) 7s. 6d.

This book is intended for the use of agricultural and horticultural students, farmers, and fruit-growers in America. It appears to be of little practical use in this country, as comparatively few of our pests are included.

The first six chapters are devoted to the structure of insects, orders, collecting, insecticides, spraying, fumigation, and general remedies.

In chapters 7 to 18 are given concise life-histories and remedies of pests of orchards, vegetables, field crops, greenhouses, shade trees, man and household, stock and poultry, and mill. Insect friends and birds of economic importance are described, the latter having, besides the usual illustrations, three splendidly coloured plates of birds' heads. The final chapter gives the four-footed pests of farms.

There are a few mistakes, most of them mis-spelling of scientific names, *Xyleborus dispar* is labelled *E. ribis* on p. 111; the Bean Beetle, *Bruchus*, is incorrectly called a Weevil on p. 244, &c. The 414 illustrations are sketches and photographs, and are particularly clear.

"Weeds of Farm Land." By W. E. Brenchley, D.Sc. 8vo. xx. 239 pp. (Longmans, Green, London, 1920.) 12s. 6d. net.

Miss Brenchley has gathered together a vast amount of information concerning the weeds of British fields, much of it from her own observation, much also from the published experience of others. It is surprising, however, to find some pernicious weeds of gardens completely ignored, such as the bishop's weed (*Aegopodium Podagraria*) and the bitter cresses (*Cardamine hirsuta* and *C. flexuosa*). *Draba verna*, though it does no harm, is deserving of passing mention as a light-land weed. Equally curious is the omission of *Lepidium Draba*, one of the worst immigrants of recent years, and the beautiful *Melampyrum arvense*, which is rare, but locally abundant in Essex as a cornfield weed. The only other thing we have to complain of is some lack of editing apparent in discrepant spelling.

The information given is very full, and the numerous line drawings which illustrate the book are excellent.

NOTES AND ABSTRACTS.

[For Index to Abbreviations, etc., see last volume.]

Abelia longituba Rehder. By W. B. Turrill (*Bot. Mag.* t. 8810; Sept. 1919).—China. Discovered by Dr. Henry. It is a shrub nearly allied to *A. uniflora*, flowers very freely in late summer, with rather wide tubular flowers of a rose colour with brighter bracts on the reddish peduncle.—*F. J. C.*

Acacia spectabilis Cunn. By J. Hutchinson (*Bot. Mag.* t. 8860, Sept. 1920).—A glaucous-leaved species, rather straggling in habit, producing yellow flowers very freely in the Temperate House at Kew in spring. Native of sub-tropical East Australia.—*F. J. C.*

Allium sikkimense Baker. By C. H. Wright (*Bot. Mag.* t. 8858, Sept. 1920).—A blue-flowered species from Sikkim, with a cylindrical bulb.—*F. J. C.*

Aphides and Frost. By J. G. Blakey (*Gard. Chron.*, Feb. 14, 1920, p. 78; 12 figs.).—Observations on the frost-resisting powers of several species, showing that they are less liable to injury by cold than is generally believed.—*E. A. B.*

Aphis saliceti (Kaltenbach), **On the Sexual Forms of.** By Maud D. Haviland (*Ann. App. Biology*, vol. vi. no. 4, April 1920, pp. 311–313).—A description is given of the male and oviparous female of *Aphis saliceti* which appear in mid-summer, instead of in the autumn, as is usual with aphides. Parallel instances are recorded, but the records are rare.—*G. F. W.*

Apple Blotch. By A. D. Selby (*U.S.A. Exp. Stn. Ohio, Bull.* 333, Feb. 1919, pp. 492–506; 5 figs.).

Apple Blotch Control. By A. J. Gunderson (*U.S.A. Exp. Stn. Ill., Bull.* 222, Sept. 1919, pp. 550–572).—This disease is caused by the fungus *Phyllosticta solitaria* E. & E., and may attack the leaves and twigs as well as the fruit. The life-history of the fungus has not yet been established, but it is known that the fungus lives over the winter in the cankers formed on the twigs. These cankers produce numerous pycnidia, liberating large numbers of spores which can readily infect neighbouring trees. The varieties least susceptible are 'Maiden's Blush,' 'Grimes' Golden,' 'Rome Beauty,' 'Stayman Winesap,' 'Jonathan,' and 'York Imperial,' and these varieties are suggested for planting in Ohio.

The second paper details the various spraying experiments for the control of this disease during 1916, 1917, and 1918 in Illinois, and it is suggested that spraying should be done about three weeks after the fall of the blossoms. A second spraying might usefully follow two or three weeks later. Lime sulphur spraying fluid was found to be more effective than Bordeaux mixture.—*A. B.*

Apple Breeding in Canada. By W. T. Macoun (*Am. Pom. Soc.*, 1917, pp. 11–27; 2 plates).—This paper gives the methods and results of the attempts being made to produce harder varieties. The main lines have been the crossing of *Pyrus baccata* with pollen from the best and hardiest existing kinds, and the raising of seedlings from some of the hardiest Russian varieties.—*A. P.*

Apple Flakes. By W. P. James (*Agr. Exp. Sta. Illinois, Circ.* No. 213, pp. 1–8; 2 figs.).—The most satisfactory way of drying apples is to cut the apple into flakes by means of an apple-peeler; dust the surfaces with sugar and dry in a current of air at 120° F. for twelve hours. Prepared in this way, the characteristic flavour of the apple is retained and no discoloration occurs. The product is packed in cartons with paraffin wrapper. The flakes may be ground to powder and preserved in bottles or capsules, or the powder may be compressed into cakes, dipped in syrup and wrapped in tinfoil and used as a sweetmeat.—*S. E. W.*

Apple-grain Aphis. By A. C. Baker and W. F. Turner (*Jour. Agr. Res.*, 18, Dec. 15, 1919, pp. 311-334).—An outline of the life-history of the apple aphid *Rhopalosiphum prunifoliae* Fitch is given. Eggs are laid in depressions on small branches; in mild attacks on large trees only in the lower part. The eggs hatch in early spring and the usual sequence of generations is followed. The aphides migrate in summer, but the alternate host is not stated. This aphid has been confused with *Aphis avenae* (R. padi L.).—G. F. W.

Apple Leaf Jassid. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxix. pp. 568-571; 1 plate).—The Apple-leaf Jassid or Frog Hopper (*Empoasca mali*) damages the fruit and foliage of the apple. Fallen leaves and weeds should be dug into the soil, and in early summer the trees should be sprayed with kerosene emulsion or tobacco-soap wash. A new species, *Empoasca australis*, is in colour deep yellow, in which respect it differs from *E. mali*. It does not cause the leaves to curl up at the sides.—S. E. W.

Apple, Powdery Mildew of the. By D. F. Fisher (*U.S.A. Bur. Pl. Ind., Bull.* 1120, pp. 1-14; 8 figs.).—This disease is caused by *Podosphaera leucotricha* (E. & E.) Salm., which makes a felt-like growth on stem, leaves, blossoms, and fruit. It is an external parasite and penetrates the host plant by "suckers," which absorb sap from the cells of the apple. It is more frequently met with in dry climates and may cause much damage to nursery stock. The fungus is found upon the pear, quince, hawthorn, cherry, plum, and other fruits as well as the apple. The varieties least susceptible are 'White Pearmain' and 'Winesap.' Spraying three or four times with lime sulphur 1 in 50 is recommended as a means of control.—A. B.

Apple, Powdery Mildew. By E. Breakwell, W. J. Allen, and W. Le G. Brereton (*Agr. Gaz. N.S.W.* vol. xxix. pp. 408-412).—When apples are affected by powdery mildew, all diseased wood and mildewed terminals must be cut out and burnt in autumn. When the blossom buds show pink, spray with sulphide of iron, later spray with sulphide of iron and lead arsenate. Three weeks later repeat this treatment, and once more if necessary.

The iron sulphide is prepared by adding 2½ gallons of commercial lime-sulphur to 12 pounds of iron sulphate dissolved in 32 gallons of water. Allow the black precipitate to settle, syphon off the clear liquid, and wash the precipitate three times by decantation. Finally add sufficient water to make the total volume 50 gallons.

Mix a portion of this stock mixture with nicotine or lead arsenate as required, and add water to bring the bulk to ten times the original volume.—S. E. W.

Apples, Cost of Producing in Yakima Valley, Washington. By G. H. Miller and S. M. Thomson (*U.S.A. Dep. Agr., Bull.* 614, April 1918; 6 plates, 14 figs.).—A study of apple-orcharding in 1915. The average annual acre cost on the 120 farms dealt with was found to be \$345.68, which, allowing for an annual yield of 432 boxes to the acre, works out at about \$0.80 per box. The greatest item of fixed cost was the interest on the money invested, which accounted for nearly a quarter of the total net annual cost.—A. P.

Apples, Storage Diseases of. By Chas. Brookes, J. S. Cooley, and D. F. Fisher (*U.S.A. Bur. Pl. Ind., Bull.* 1160, pp. 1-25; 26 figs.).—The diseases of storage apples depend upon conditions which influence the development of parasitic fungi, and also upon abnormal physiological conditions in the fruit itself; and these are largely due to bad storage conditions. Scald and various apple rots are often produced when temperature of storage is high, while deficient ventilation is also a contributory factor. Each variety of apple, however, has its storage limitations, and these vary from year to year.—A. B.

Arisaema Fargesii Bucket. By C. H. Wright (*Bot. Mag.* t. 8861, Sept. 1920).—Spathe purple with paler lines, yellow or greenish. Native of Szechwan and thriving under greenhouse treatment.—F. J. C.

Atraphaxis Billardieri Jaub. et Spach. By O. Stapf (*Bot. Mag.* t. 8820; Dec. 1919).—A mountain shrub of Greece, Crete, Asia Minor, and Syria, remarkable for its bright perianth segments, which enlarge after flowering. It is hardy in the neighbourhood of London, where it forms a dwarf semi-prostrate shrub.

F. J. C.

Avocado in Guatemala. By W. Popenoe (*U.S.A. Dep. Agr., Bull.* 743; 23 plates).—Thirty-six varieties of avocado grown in Guatemala are described.

S. E. W.

Bacterial Diseases of Plants in Great Britain and Ireland, An Epitome of. By Sidney G. Paine (*Ann. Appl. Biol.* vol. v. No. 1, July 1918, pp. 62-76).—A general review of the study of bacteria in relation to plant diseases, with references to British literature on the subject. Symptoms of disease, host-plants, distribution, &c., in various bacterial diseases are given for white rot of turnips and other vegetables. Heart-rot of celery, potato "blackleg," potato and tomato brown rot, iris rot, yellow disease of hyacinths, black rot of cabbage and other cruciferous plants, bacterial blight of fruit blossoms, bacterial blight of tomatos, orchid leaf-spot disease, bacterial disease of *Pisum sativum*, potato scab, crown gall, and "so-called physiological diseases"—potato leaf-rot, potato "sprain," mosaic disease of tomatos, and silver-leaf—are dealt with. The means of control in bacterial disease are difficult and necessitate a vast amount of research.—R. C. S. R.

Baikiaea insignis Benth. By J. Hutchinson (*Bot. Mag.* t. 8819; Dec. 1919).—Belonging to the tribe Amherstieae of the Leguminosae, this native of Fernando Po and parts of tropical Africa bears very large white flowers with brown sepals 4 in. long, about half the length of the petals. The plant has attained a height of 30 feet in the tropical house at Kew and has borne its fugacious flowers freely.—F. J. C.

Bananas. By C. E. B. Walsh (*Agr. Gaz. N.S.W.* vol. xxix. pp. 731-736).—Bananas require well-drained soil rich in potash, in a sheltered position, with a heavy summer rainfall. They will thrive on land formerly devoted to the cultivation of sugar cane. If the soil shows signs of acidity, lime in moderate quantities must be frequently applied. The suckers are planted ten or twelve feet apart. They begin to bear in eighteen months. The 'Cavendish' is only 10 feet high; it is hardier and has a finer flavour than other varieties, but the fruit has rather a delicate skin and must be packed in cases.—S. E. W.

Bark-Boring Beetles: The Structure, Bionomics, and Forest Importance of Cryphalus Abietis Ratz. By Walter Ritchie, B.Sc., B.Sc.(Agr.) (*Ann. Appl. Biol.* vol. v. Nos. 3 and 4, April 1919, pp. 171-199; figs.).—Description of the beetle, egg, larva, and brood galleries. Observations on the life-cycle and number of broods a year are given, and its economic importance discussed. Natural enemies play a part in checking the numbers.—R. C. S. R.

Bees and Fruit (*Agr. Gaz. N.S.W.* vol. xxx. p. 208).—Bees never attack sound fruit, but if the skin is broken by birds, or cracked, the bees will suck up the juice, leaving nothing but the skin and seeds or stones.—S. E. W.

Berberis atrocarpa Schneider. By W. J. Bean (*Bot. Mag.* t. 8857, Sept. 1920).—Collected by Wilson in 1908 in W. Szechwan. It is nearly related to the black-fruited *B. levis* and, like that species, has scarcely visible secondary nerves. It is distinguished by angular, grooved branchlets, thinner, longer, narrower leaves more remotely toothed, and the smaller clusters of flowers (not more than eight). It is practically hardy.—F. J. C.

Berberis subcaulialata. By J. Pinelle (*Rev. Hort.* vol. xcii. pp. 28, 29; 2 figs.).—The *Berberis subcaulialata* of Schneider is a hardy shrub, more vigorous in growth than *B. Wilsonae*, attaining a height of 5 feet. It retains its leaves till December or January and bears numerous clusters of pale-yellow flowers in May. The red berries are highly decorative.—S. E. W.

Big Bud in Black Currants, "Reversion" and Resistance to. By A. H. Lees, M.A. (*Ann. Appl. Biol.* vol. v. No. 1, July 1918, pp. 11-27; figs.).—Owing to an apparently close connexion between Reversion and Big Bud, the two subjects are treated together. Characteristics of normal growth and diseased growth are discussed (with comparisons between Seabrook's 'Black' and 'Boskoop Giant') and possible remedies. Reversion is characterized by "running off" of the fruit, unusual amount of lateral growth, sharp-pointed leaves and long thin internodes. It is apparently caused by a check to the terminal growth by a change of the terminal wood bud into (a) a big bud, (b) a blind or killed bud, (c) a fruit-bud. Varieties resistant to big bud revert under (b) and (c). An unaccountable form of reversion occurs in young bushes before mite or aphid are present. Seabrook's 'Black' is mite-resistant.—R. C. S. R.

Birds and Public Reservations. By W. L. McAtee (*U.S. Dep. Agr., Bull.* 715, pp. 1-12; 4 figs.).—Wild birds may be attracted to public parks and cemeteries by planting groups of fruit-bearing shrubs, providing water and feeding-stations, and erecting nesting-boxes.—S. E. W.

Bordeaux Oil Emulsion Spray. By C. A. Macrum (*Board Hort. Rep. Oregon*, 1919, p. 82).—Some American authorities recommend no less than ten sprayings of orchards every year. To avoid this amount of labour a combined Bordeaux oil emulsion spray has been devised. Applied as the buds are opening, it will keep in check San José scale, aphid, leaf roller, red spider, leaf curl in peaches, and anthracnose and *Cylindrosporium*.

The mixture is prepared as follows :—Pour 24 lb. of copper sulphate dissolved in 24 gallons of water into 150 gallons of water, add milk of lime from 12 lb. of lime until the mixture is neutral to litmus paper; add 1½ lb. of glue in 1½ gallons of water. Stir up 12 gallons of oil emulsion with a little water and pour this with constant stirring into the liquid and make up to 200 gallons with water. Use at once.—S. E. W.

Brachystelma foetidum Schlechter. By S. A. Skan (*Bot. Mag.* t. 8817; Sept. 1919).—Asclepidaceæ. Produces a large tuber (which is eaten by the natives of the Transvaal, and which is known as "Hottentot's bread"). It has bright red, rather small flowers with a disagreeable odour.—F. J. C.

Brown Rot in Stone Fruit. By G. P. Darnell Smith (*Agr. Gaz. N.S.W.* vol. xxix. pp. 662–663).—Attempts to prevent the spread of brown rot in Peaches and Nectarines packed in cases were futile. The disease can only be controlled by spraying the dormant fruit-trees with Bordeaux mixture and destroying mummified fruit.—S. E. W.

Bulbophyllum macrobulbum J. J. Im. By R. A. Rolfe (*Bot. Mag.* t. 8842; June 1920).—A New Guinea species at first shown as *B. Balfourianum* (Journ. R.H.S. 41, p. cxxxviii (1916)). It calls for tropical treatment, and has large flowers in the way of *Cymbidium Huttonii*, blotched and spotted red and orange on a yellow ground.—F. J. C.

Cabbage Pest (*Baridius chlorizans*). By L. Billaudelle (*Rev. Hort.* vol. xcii. pp. 162, 163; 1 fig.).—This minute green beetle, about $\frac{3}{16}$ inch long, lays her eggs in the axils of the leaves in June. The grubs resemble maggots, are $\frac{1}{8}$ inch in length. They burrow tunnels in the stems which ultimately leads to the destruction of the plant. There is no satisfactory means of destroying this pest except collecting and burning the plants attacked.—S. E. W.

Caeti, Mucilage in, The Origin and Nature of. By F. E. Lloyd (*Amer. Jour. Bot.* vol. vi. No. 4, April 1919, pp. 156–166).—The mucilage in *Opuntia* originates within and is confined to large cells (mucilage idioplasts) scattered throughout the medullary and cortical parenchyma. Their absolute number is correlated with the species. The first visibly demonstrable change is from cellulose to a hydrocellulose, and this in turn is converted into mucilage. As this hydrates, it swells and compresses the protoplasm toward the middle of the cell. The protoplasm remains attached more or less to the pits, giving rise to radiating strands extending from the nucleus to the wall layer. The mucilage shows lamination which is determined by water-content, and this lamination was formerly attributed to secondary thickening. The mucilage absorbs certain dyes with great vigour. The viscosity of the mucilage is lowered by the absorbed dyes, and this is in direct relation to the degree of absorption.

A short bibliography is appended.—A. B.

Calanthe tricarinata Lindl. By R. A. Rolfe (*Bot. Mag.* t. 8803; June 1919). This orchid was discovered in 1819 in Nepal and occurs in Yunnan and Japan, whence it was introduced. It has rather small flowers, yellowish-green, with a red lip. It thrives with *C. Masuca*.—F. J. C.

Calyx Worm Control, Dust and the Spray Gun in. By F. Childs (*Mth. Bull. Dep. Agr., California*, 13, Aug. 1920, pp. 331–338).—Deals with the control of codling moth and similar calyx larvæ by dusting. It is difficult at present to obtain suitable sprayers, which must break up the powder into fine particles; 275 lb. pressure with a 3½ h.p. sprayer produces a fair spray with two nozzles, and an excellent spray with one. When properly applied, the material (lead arsenate powder) should settle on the parts needing protection, and will give complete control against calyx worms.—G. F. W.

Campanula pyramidalis. By F. Lesourd (*Rev. Hort.* vol. xcii. p. 124; 1 fig; 1 coloured plate).—This hybrid of *Campanula pyramidalis* and *C. versicolor* is intermediate between its parents as regards foliage, colour, and arrangement of flowers. It inherits the prolonged period of flowering of *pyramidalis*; the flowers are fertile.—S. E. W.

Campanula sulphurea Boiss. By W. B. Turrill (*Bot. Mag.* t. 8827; Dec. 1919).—A native of dry sandy places in Syria and Palestine, with intense yellow flowers, not quite hardy, and subject to the attacks of slugs.—F. J. C.

Canada Thistle, Eradication. By A. A. Hansen (*U.S. Dep. Agr., Farmers' Bull.* 1002, pp. 2-15; 4 figs.).—The Canada Thistle, *Cirsium arvense*, was introduced to the North American continent from Europe. It is chiefly distributed by the use of impure grass and clover seed. This pest may be eradicated by systematically destroying the top growth of the plant, using the sweep or knife type of cultivator, supplemented by the use of the hand hoe. Just before the thistle flowers, plough shallow, and later in the season use the disc harrow. The following spring plant a cultivated crop and see that no thistle tops survive.

S. E. W.

Capsid Bugs, Investigation of the Nature and Cause of the Damage to Plant Tissue resulting from the Feeding of. By K. M. Smith (*Ann. App. Biol.* vol. vii. no. 1, Sept. 1920, pp. 40-55; 7 figs., 1 plate).—This research was to discover the cause of the damage done to apples, potatoes, &c., by the capsid bugs, *Plestocoris nigricollis* and *Lygus pabulinus*.

It was definitely proved that mechanical means were not the chief agents of injury, but the injection into the plants' tissues of some dilute poison. When the salivary glands of these harmful capsid bugs were placed on cut slices of potato, a violent reaction took place which killed much of the tissue surrounding the glands, whereas on an injection of glands from the harmless apple bug, *Psallus ambiguus*, the result was nil.—G. F. W.

Carnation Stem Rot and its Control. By Geo. L. Peltier (*U.S.A. Exp. Stn. Ill.*, *Bull.* 223, Sept. 1919, pp. 578-607; 5 figs.).—This disease is caused by *Rhizoctonia Solani* Kühn (*Corticium vagum* B. & C.), and is widely scattered in Illinois. It may attack stem cuttings, seedlings, or mature plants, and enters the plant at a point just below the ground level. Decay follows and soon sclerotia in large numbers are formed on the decomposed mass. Since the disease is a soil disease, the best methods of control are obviously in completely disinfecting the soil; but it is found that formalin, sulphuric acid, lime, Bordeaux mixture have but little effect upon the fungus. Steam sterilization is the only effective remedy. At the same time due care with regard to temperature and amount of moisture is essential if the plants are to be kept in a healthy condition.—A. B.

Carnations. By H. Blin (*Le Jard.* vol. xxxiv. pp. 158-160).—In the cultivation of Carnations for cut flowers, good results are obtained in soils containing humus by the use of chemical manures. Before the Carnations are planted out, the soil receives 220 lb. of superphosphate and 150 lb. of potassium sulphate per rood; 45 lb. of sodium nitrate dissolved in water is applied in successive doses from April to October. During the flowering season the amount of potassium sulphate is increased and the mixture of superphosphate, nitrate and sulphate mixed in water and gradually applied to the plants to the great improvement in the size and colour of the flowers.—S. E. W.

Catasetum. By J. Poupion (*Rev. Hort.* vol. xcii. pp. 98-100; 3 figs.).—Amateurs find a difficulty in flowering Catasetum, but good results are obtained by paying attention to the following points. The Catasetum requires a period of absolute rest at a temperature of 50-55° F. Water is withheld. In March the plants are taken out of their pots, the old compost is removed and withered roots and bulbs are cut off. They are repotted in ordinary pots half filled with pieces of charcoal and crocks and the remainder with sphagnum moss and polypodium fibre (1-2) and a little sand. They are placed near the glass in a house at 68-70° F. When the roots show signs of growth, the pots are immersed in warm soft water. Spraying is prohibited. Towards the end of April the supply of water is limited as the flowering season begins. Exposure to direct sunlight is injurious. When the flowers are over the supply of water is increased, but it is stopped in November.—S. E. W.

Caulophyllum thalictroides. By J. Hutchinson (*Gard. Chron.*, Feb. 7, 1920, p. 63; 1 fig.).—Calls attention to the probability of this and the Asiatic *C. robustum* being one species. Also describes the curious fruit produced by the early falling away of the carpel, leaving two seeds on long funicles resembling two-stalked fruits.—E. A. B.

Cedar Apple Rust. By Cromwell (*Iowa State Hort. Soc. Rep.* 1918, pp. 127-131).—The cedar apple rust requires two hosts for its life cycle. The spores

from the rusty spots on the apple leaves are carried by the wind to the cedar trees, where galls develop twenty months later. These galls yield spores which attack the apple trees, causing the leaves to fall off. Hawthorns and crabs are also attacked. Spraying has not been successful; the only remedy appears to be the removal of the cedars.—S. E. W.

Celery Fly, Oviposition in the. By T. H. Taylor (*Ann. Appl. Biol.* vol. v. No. 1, July 1918, pp. 60–61; 1 text fig.).—The habits of the celery fly are described, with special reference to the egg-laying process and the burrowing of the larva in the leaf tissues.—R. C. S. R.

Chemotropic Responses of Insects, Field Experiments on the. By A. D. Imms and M. A. Husain (*Ann. Appl. Biol.* vol. vi. No. 4, April 1920, pp. 269, 292; 1 fig.).—This paper is intended as a basis for further research into the chemotropic responses of insects.

A bibliography and an historical review are given of the early papers dealing with this subject; the author's experiments are detailed.

Few insects besides diptera were captured, probably on account of the small size of the traps used. Beer and cane molasses proved to be the most successful baits. The authors point out the difficulties in this research, and the many factors to be taken into consideration.—G. F. W.

Cherry Tree Grafting. By P. Lecolier (*Rev. Hort.* vol. xcii. pp. 161–162).—Whip-grafting on the wild cherry is the most rapid method of renewing the cherry orchards destroyed by the Germans in Belgium. The operation should be carried out in the second half of September.—S. E. W.

Chestnut Trees, Effects of Injection of Chemicals upon. By C. Rumbold (*Amer. Jour. Bot.* vol. vii. Nos. 1 and 2, Jan. and Feb. 1920, pp. 1–20, 45–56; 2 plates).—These experiments were undertaken in the hope of discovering some remedy for the chestnut bark disease (*Endothia parasitica* Murr.) in eastern U.S.A. Ordinary methods of spraying and soil disinfectants were apparently without avail in checking this disease. A large number of substances, organic and inorganic, were injected into 156 'Paragon' chestnut trees during the growing season, and it was found that solutions of organic compounds were more readily "absorbed" than inorganic solutions, and usually the more concentrated the solutions of chemicals the more readily were they absorbed by the trees. In S.W. Pennsylvania, June was the best month for injection, as far as the rate of intake was concerned. The injected solution as a rule passed through the vessels of the youngest annual rings up and down the trunk in a zone whose width was usually little more than that of the injection hole. As a rule the injection was not harmful to the trees in the case of the alkali metals and organic compounds, but the injection of heavy metals was detrimental. A watery extract of chestnut blight canker was harmful, but healthy bark extract was not. Many of the bases produced characteristic colorations of the leaves. It was found that solutions of lithium salts injected in the spring months may have an effect upon the blight, in that the growth of the canker was checked and healthy callus was formed over the canker. Further experiments, however, are necessary to obtain conclusive results.—A. B.

Chrysanthemums, Varieties of. By Hort (*Le Jard.* vol. xxxiv. pp. 53–55, 61, 62, 70, 71; 4 figs.).—A list of the best varieties of Chrysanthemums classified in fourteen groups recommended by a committee of French specialists.—S. E. W.

Citrus, Effects of Alkali on. By W. P. Kelley and E. E. Thomas (*U.S.A. Exp. Sta. California, Bull.* 318, Jan. 1920, pp. 304–338; 2 figs.).—It is generally believed that citrus trees are especially sensitive to alkali, and this is thought to be due to excessive concentration of the alkali. The symptoms of alkali injury are a yellowing of the margins and tips of the leaves, followed by a shedding of the entire foliage. 'Navel' oranges are more sensitive than 'Valencia,' and 'Eureka' lemons more sensitive than 'Lisbon.' Generally lemon trees are more sensitive than orange trees. It was found that some irrigation waters were highly charged with alkali, and various tables are issued showing the analyses of some of the irrigation waters used in California. The use of mountain water is advocated and a plentiful supply can be obtained by use of dams and reservoirs.—A. B.

Citrus Fruit Improvement. By A. D. Shamel, L. B. Scott, C. S. Pomeroy, and C. L. Dyer (*U.S.A. Bur. Pl. Ind., Bull.* 813, June 1920, pp. 1–89; 22 figs.).—The lemon (*Citrus Limonia* Osbeck) is largely grown in California, which State is responsible for practically 90 per cent. of lemons produced in the United States.

The more important commercial varieties are the 'Eureka,' 'Lisbon,' and 'Villa Franca.' The 'Eureka' variety originated from a seedling in Los Angeles about 1860. Many important strains have since been developed by propagation of bud varieties, and these may influence the habit of the trees' growth, the characteristics of the foliage and blossoms, and the desirable qualities (colour, shape, size, texture, juiciness) of the fruits.

The present paper was an endeavour to determine the behaviour of the trees of the different strains, and to isolate and propagate the superior varieties by careful bud selection. Exhaustive data of each tree were kept and the various characteristics developed after grafting. The results show that great improvements follow grafting by carefully selected buds which have been placed upon trees bearing large crops throughout a number of years. As a result of these investigations a department of bud selection has been established by the fruit-growers of the State whereby reliable bud wood from record lemon trees may be obtained by all growers.—A. B.

Coccidae affecting Various Genera of Plants, A List of. By E. E. Green, F.E.S., F.Z.S. (*Ann. Appl. Biol.* vol. 5, No. 2, Oct. 1918, pp. 143-156).—Continued from vol. iv. p. 239. From *Laburnum-Phenacoccus* to *Pyrus-Lepidosaphes ulmi*.
R. C. S. R.

Coccidae, affecting Various Genera of Plants, A List of. By E. E. Green, F.E.S., F.Z.S. (*Ann. Appl. Biol.* vol. 5, Nos. 3 and 4, April 1919, pp. 261-273).—Continued from vol. v. p. 156. From *Quercus monophlebus* to *Zuccagnia-Lecanium*.

A number of observations conclude the list.—R. C. S. R.

Codling Moth in Walnuts, The. By H. J. Quayle (*Mth. Bull. Dep. Agr., California*, 9, March 1920, pp. 64-69; 2 figs.).—The mode of attack of this pest on Walnuts is described. The moth is recorded as attacking Walnuts in France, South Africa, and California, and appeared in the last two places almost simultaneously. The life-history is similar to that on the Apple.

Larvæ hatching out in early spring enter the calyx end of the nut, and, until the middle of July, usually bore towards its centre. Those hatching out later, after the nuts have attained some size, enter where two nuts are in contact. Banding trees is only a partial check. Spraying and dusting with lead arsenate (preferably basic or neutral, otherwise injury is easily done to the trees) is effective where two applications are made.—G. F. W.

Coelogyne integerrima Ames. By R. A. Rolfe (*Bot. Mag.* t. 8856, Sept. 1920).—Native of Philippines. Flowers yellowish green, with a yellow scarlet-striped entire obtuse lip. It requires a tropical temperature.—F. J. C.

Compidosoma tortricis, Sp. N., On a new Polyembryonic Encyrtid (Chalcidoidea) bred from the Strawberry Tortrix Moth. By J. Waterston (*Ann. App. Biol.* vol. vii. no. 1, Sept. 1920, pp. 1-5; 5 figs.).—During investigations into the life-history of the strawberry tortrix moth, *Oxygrapha comariana*, a small chalcid was reared which proved to be a new species. A detailed description is given in the text.—G. F. W.

Conifers on the Riviera. By A. R. Proschowsky (*Rev. Hort.* vol. xcii. p. 75).—The Aleppo Pine, *Pinus excelsa*, *P. canariensis*, *P. Laricio*, *P. radiata*, *Picea Morinda*, *Cedrus Deodara*, *Cupressus sempervirens*, *C. lusitanica*, *C. guadalupensis*, *C. macrocarpa*, *Cryptomeria japonica*, *Araucaria excelsa*, *A. Bidwilli*, and *Podocarpus*, *Cephalotaxus*, *Thuyopsis dolobrata*, and the Junipers thrive on the Riviera in calcareous soil. Unfortunately *Pinus canariensis* and *P. radiata* are seriously damaged by the ravages of the procession caterpillar.—S. E. W.

Coreopsis elegans. By M. Houssy (*Le Jard.* vol. xxxiv. p. 110; 1 fig.).—This hardy annual deserves a place in every garden. It is invaluable for cut flowers, as it is very floriferous. The yellow flowers have purple discs.—S. E. W.

Cornus Kousa Buerg. By W. J. Bean (*Bot. Mag.* t. 8833; March 1920).—A Chinese and Japanese species forming a flat-topped small tree. It is quite hardy, and the Chinese form figured has four white bracts surrounding the inflorescence, each 2 inches long by about 1 inch in diameter.—F. J. C.

Cotoneaster serotina Hutchinson (*Bot. Mag.* t. 8854, Sept. 1920).—A small tree allied to *C. turbinata* and *C. glaucophylla*, but it has smooth berries and green leaves. It is perfectly hardy and flowers late, its panicles of scarlet fruits ripening about Christmas. A great acquisition. Collected by Forrest in West China.—F. J. C.

Cotyledon oppositifolia Ledeb. By R. A. Rolfe (*Bot. Mag.* t. 8822; Dec. 1919).—Attains size of a small tree. Native of Baluchistan. Distinguished from *C. sanguinea* by truncate or cordate base of leaf (not cuneate), foliage and summit of ovary glabrous. Flowers white in May; fruits globose, clear translucent yellow.—*F. J. C.*

Crataegus Wattiana Hemsl. et Lace. By W. J. Bean (*Bot. Mag.* t. 8818; Sept. 1919).—Attains size of a small tree. Native of Baluchistan. Distinguished from *C. sanguinea* by truncate or cordate base of leaf (not cuneate), foliage and summit of ovary glabrous. Flowers white in May; fruits globose, clear translucent yellow.—*F. J. C.*

Cucurbits, Bacterial Wilt of. By F. V. Rand and Ella M. A. Enlows (*U.S.A. Bur. Pl. Ind., Bull.* 828, May 1920, pp. 1-43; 9 figs.).—The study of the bacterial wilt on cucumbers, caused by *Bacillus tracheiphilus* (E. F. Smith), has been continued since 1915, and an exhaustive study of the relation of soil and insects to the distribution and control of the disease has been made by the authors. The disease occurs in thirty-one States and affects cucumbers, cantaloups, squashes and pumpkins, but not water-melons. The severity of the attack varies from a single plant to 95 per cent. of the crop. Very little direct relation between percentage of infections and severity of the disease is due to weather conditions, but the chief carriers of the disease in summer-time are the striped cucumber beetles, *Diabrotica vittata* and *D. duodecimpunctata*. Infection of the plant is due to wounds on surface. The disease cannot winter in the soil. Cucumbers are the most susceptible and water-melons are the least susceptible to the disease. Control measures suggested are some strong insecticide and some protective spraying fluid for the plants.—*A. B.*

Currant Grapes, Growing. By George C. Husmann (*Am. Pom. Soc.*, 1917, pp. 66-69; 4 plates).—Their profitable growth in the United States has been demonstrated. Two conditions are necessary—they must be grafted on phylloxera-resistant stocks and incised while in blossom, the latter operation consisting in making two parallel incisions through the bark, around either the trunks, arms, or cones of the vines, and taking out the bark between the cuts.
A. P.

Daphne tangutica Maxim. By W. J. Bean (*Bot. Mag.* t. 8855, Sept. 1920).—R. Farrer distributed a *Daphne* under his No. 271, which, while related to *D. retusa*, is distinct in its longer narrower leaves, less markedly ciliate bud scales, and glabrous stigma. It flowers in spring and appears to be perfectly hardy, although not transplanting readily. The flowers are pinkish [and exceedingly sweet-scented].—*F. J. C.*

Delphinium Pylzowii Maxim. By O. Stapf (*Bot. Mag.* t. 8813; Sept. 1919).—This plant has been known in cultivation since 1876, but was reintroduced by Mr. Farrer, who collected it in the Min-Shan range (*JOURNAL R.H.S.* xlii. p. 332). It is a perennial requiring the same cultivation as *D. grandiflorum*, with dark azure-violet, pale rose, or rose-lilac flowers.—*F. J. C.*

Derris as an Insecticide. By N. E. McIndoo (*Jour. Agr. Res.* 17, Aug. 1919, pp. 177-200).—An historical review is given of the discovery of Derris as an insecticide. Several species of *Deguelia* (Derris) are known, but only *D. elliptica* and *D. uliginosa* have proved sufficiently toxic and useful.

Although these plants have long been known as a fish poison, it is only in recent years that its value as an insecticide has been discovered. It acts both as a contact and a stomach poison, but is useless as a fumigant.

Experiments are described, with tables showing results of the application of Derris as a powder and liquid spray.

Several methods of extracting the toxic property are given, and denatured alcohol proved a good solvent. The toxic principle is thought to be a resin, known as Derrid, and appears to kill insects by motor paralysis.

In the dusting experiments described it was found that the nerve tissue of the insect was first affected, and only small quantities got into the mouth to act as a stomach poison.

Derris powder was found efficient against several insects, including *Aphis rumicis* L., *A. pomi* de Geer, and *Myzus persicae* Sulz.; but of no use against Red Spider, Mealy-bug, Cockroaches, etc.

In proprietary washes, Derris extract is mixed with soft soap, and can be dissolved in water and used at once.—*G. F. W.*

Desmodium cinerascens Franch. By J. Hutchinson (*Bot. Mag.* t. 8805, June 1919).—Native of S.-W. China, and introduced by M. Maurice de Vilmorin in 1896. It is quite hardy, forming a bush 3 to 4 feet high. It flowers in October, the inflorescence being several inches long and the flowers rosy-carmine.—*F. J. C.*

Disporum pullum var. **brunnea** C. H. Wright (*Bot. Mag.* t. 8807; June 1919).—Introduced from W. Hupeh by E. H. Wilson through the Arnold Arboretum, this plant thrives in partially shaded situations in good sandy loam. The brownish tubular perianth has the segments spreading at the tips and so differs from the type.—*F. J. C.*

Dusting the Orchard. By F. H. Dudley etc. (*U.S.A., Maine, Bull.*, vol. 19, No. 3, Sept. 1920).—These papers comprise the views of four authors advocating the use of dust instead of liquid sprays. The advantages are time and labour saving, better transport, and cheaper upkeep. As with liquid spraying, a thorough application is necessary. The opinion of all the authors is that there is a good future for dusting, and the opinion of many growers is favourable.

Two formulæ are given: (1) sulphur 45 per cent., tobacco 40 per cent., and lead arsenate 15 per cent.; and (2) sulphur 85 per cent. and lead arsenate 15 per cent., and the ingredients so finely ground as to pass through a silk cloth of 200 meshes to 1 inch.—*G. F. W.*

Dusting and Spraying Experiments. By W. C. Dutton (*U.S.A. Exp. Stn. Michigan, Bull.* 102, March 1920, pp. 3-50; 20 figs.).—A detailed account of dusting and spraying experiments carried out during 1918-19. Although the cost of material for dusting is higher than for spraying, the application costs less.

The operation may be done when the foliage is wet or dry, but cannot be performed satisfactorily if there is much wind. A driving spray is unsatisfactory, and drenching the trees should always be avoided. Dusting effectively controlled apple scab and biting insects, and gave as good results as when lime-sulphur and lead arsenate were used.

Results are given of the effect of dusting apples, cherries, plums, peaches, currants, and potatoes.

Dry lime-sulphur did not control apple scab, so that it cannot be profitably substituted for lime-sulphur solution. Lead arsenate is thoroughly recommended on all kinds of fruit-trees, and although calcium arsenate proved efficacious on potatoes it was unsatisfactory on fruit-trees.—*G. F. W.*

Ecology of Foliar Anatomy of some Plants of a Prairie Province in Iowa. By A. Hayden (*Amer. Jour. Bot.* vol. vi. No. 2, Feb. 1919, pp. 69-85; 5 plates).—The following is a summary of the conclusions arrived at:

The leaves of prairie plants show a xerophytic tendency, as shown by the specialized palisade cells, thick-walled epidermis without trichomes, and the presence of water-storing tissue. The upland plants have a thinner epidermis than those of the lowlands. Of the alluvial basin leaves studied, 50 per cent. were bifacial and $12\frac{1}{2}$ per cent. were centric to subcentric, while of the upland plants 33 per cent. had bifacial leaves and 50 per cent. were centric to subcentric.—*A. B.*

Ecology of Subterranean Anatomy of some Plants of a Prairie Province in Iowa.—By A. Hayden (*Amer. Jour. Bot.* vol. vi. No. 3, March 1919, pp. 87-105; 12 plates).—A study of the anatomy of the subterranean organs of prairie plants shows there is a tendency to the production of prominent mechanical tissue in plants of dry habitats and a reduction of parenchyma. In moist habitats the proportion of parenchyma is greater than that of the mechanical tissue. The vascular tissue is variable in quantity. The subterranean stem is predominant as an equivalent of the primary root, especially in moist lowland regions. It is more efficient than the root in propagation. Primary roots which show secondary thickening resemble stems in their concentric manner of expansion. The stem, however, has a pith area which serves as a reservoir for water and therefore increases its efficiency for radial distribution.

Bibliographies are appended to both papers.—*A. B.*

Electricity for Heating Greenhouses. By A. Guion (*Rev. Hort.* vol. xcii. p. 64).—Where a cheap supply of electricity is available the greenhouse may be heated by electric radiators, but for orchids and other delicate subjects it is better to use the thermo-syphon system employing an electric furnace for heating the water.—*S. E. W.*

Erica Haroldiana. By S. A. Skan (*Bot. Mag.* t. 8835; March 1920).—A Cape species related to *E. nobilis*, with greenish-tinged urceolate flowers rosy at the mouth, borne in short terminal panicles. It succeeds under cool greenhouse treatment, but is still very rare.—*F. J. C.*

Euonymus alatus Regel. By W. J. Bean (*Bot. Mag.* t. 8823; Dec. 1919).—A widely distributed plant in North and Central China, Japan, etc., but not producing its purplish fruits very freely in this country. In spite of this, the shrub, which grows to about 10 feet, is very valuable when planted in a sunny place in autumn for its rich red foliage. Easily distinguished by its winged stems from other species of the genus.—*F. J. C.*

Explosives, Land Clearing by (continued). By C. W. Burrows (*Agr. Gaz. N.S.W.* vol. xxx. pp. 381-390; 5 figs.).—Tree stumps can be split by small charges of gelignite. After an interval for drying the shattered wood can be destroyed by fire. Boulders and floating rocks can also be removed by gelignite. It is generally better to dig out post-holes without using explosives to soften the ground. The posts are firmer in the hard soil.—*S. E. W.*

Fig Growing. By W. A. Taylor (*U.S.A. Dep. Agr., Farm. Bull.* 1031; 45 pp., 24 figs.).—The cultivation of figs and the best varieties for growing in the South Atlantic and Gulf States are described. Figs thrive on well-drained soil containing plenty of humus and well supplied with moisture. The fine fibrous roots lie near the surface and are easily damaged by careless cultivation.—*S. E. W.*

Fertilizers, Injuries by Borax in. By O. Schreiner, B. E. Brown, J. J. Skinner, and M. Shapovalov (*U.S.A. Bur. Pl. Ind., Circ.* 84, Feb. 1920, pp. 1-35; 25 figs.).—In 1917 some injurious effects of borax in corn fertilizers were noted in Indiana, and these effects were attributed to very small amounts of borax. Experiments were made, and this paper records some results obtained. As might be expected, differences in soil and climatic factors play an important part in determining the toxic limits of borax in fertilizers. The addition of a very small amount of borax under unfavourable weather conditions and local concentration in the soil may produce unfavourable results in the crops. It was found that potatoes, cotton, and other crops were similarly affected by small amounts of borax in the soil.—*A. B.*

Flocculation. By Spencer U. Pickering (*Woburn*, 17th Report, 1920, pp. 77-82).—Investigations on the nature of the flocculation of clay by acids and alkalis and on the effects of frost on clay. The acids in the soil, which exist in the form of comparatively bulky hydrates, unite with the clay particles, thus increasing their size two or three times, and these composite particles—solid nuclei in a liquid envelope of weak acid—coalesce to form larger masses. With alkalis the results are substantially the same. These adsorption compounds are easily decomposed, even by physical means, and heavy rain, by washing away some of the acid, causes deflocculation to a corresponding extent, and thus the effect of rain in making a clay soil less workable is explained.

The action of frost is diametrically opposite to that of a flocculating agent, the breaking down of clods being largely effected by mechanical disruption. It also affects the ultimate particles themselves by depriving them of their chemically combined water, resulting in a shrinkage of the particles, which thereby become more dense and subside more rapidly, thus forming a more compact sediment.—*A. P.*

Fragaria, Some Notes on. By C. W. Richardson (*Jour. Gen.* x. pp. 39-46; July 1920).—In continuation of experiments already alluded to in these abstracts, the author records results of various seedling raisings and observations upon the genetics of the strawberry.—*F. J. C.*

Fruit Packing. By W. J. Allen and W. le Gay Brereton (*Agr. Gaz. N.S.W.* vol. xxx. pp. 430-436, 517-522, 572-576, 652-656, and 721-725). A detailed account of the methods employed for packing apples, apricots, and peaches.
S. E. W.

Fruit Trees, Vigour in. By C. I. Lewis (*Board Hort. Oregon*, 1919, pp. 114-120).—Orchard trees reaching an age of fifteen to twenty-five years frequently show a want of vigour, making little growth and bearing light crops. The application of 3-7 lb. of sodium nitrate to each tree one month before the buds appear has a wonderful reinvigorating effect on the growth and fertility.—*S. E. W.*

Fruiting, Studies in Biennial. By R. H. Roberts (*Am. Pom. Soc.* 1917, pp. 28-33).—Biennial fruiting is not due to the constitutional habit of a tree, for flowering in successive years can be induced in a tree of this character by blossom removal, but it is considered to be owing to the absorption by a large crop of blossom of the reserve food usually stored in a tree, so that when blossom-bud differentiation should begin, about a month after flowering, the tree is in no condition to form blossom buds in readiness for successive bearing. The present investigations are far from completed, but the writer confidently expects by judicious modifications of cultural operations to overcome the biennial fruiting habit to a great extent.—*A. P.*

Fruits, Vegetative Propagation of Tropical. By P. J. Wester (*Am. Pom. Soc.* 1917, pp. 82-94; 8 plates).—Compared with the improvements which have been effected in the fruits of temperate countries little or nothing has been done to raise better varieties of most tropical fruits, so many of the latter being of surprisingly good quality in their wild or semi-wild state. The writer thinks there are great opportunities for improving tropical fruits by asexual propagation of seedlings of exceptional merit, and he gives a list of about 100 species with the method of such propagation within the limits of his own experience.—*A. P.*

Fungicide, A Copper Emulsion as a. By H. and L. K. Wormald (*Ann. Appl. Biol.* vol. v. Nos. 3 and 4, April 1919, pp. 200-205; fig.).—Methods of preparing copper sulphates and soft-soap solution as a fungicide. Experiments in the laboratory and on growing potato plants in the garden are given. Preventive action against blight (*Phytophthora infestans*) is exhibited by an emulsion containing the equivalent of 0.4 per cent. copper sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) and 2 per cent. soft soap.—*R. C. S. R.*

Gaultheria cuneata Bean (*Bot. Mag.* t. 8829; Dec. 1919).—Originally called *G. pyroloides* var. *cuneata*, this native of Szechwan proves distinct from the Japanese *G. pyroloides* as well as from the Sikkim *G. pyrolaeifolia*, to both of which it is allied. It is a low-growing, perfectly hardy evergreen, thriving in moist peaty soil, with narrowly obovate or oblanceolate leaves and a densely hairy ovary and fruit. The fruits are enclosed in the fleshy white calyx.—*F. J. C.*

Grafting, Yema, of the Vine. By H. E. Laffer (*Agr. Gaz. N.S.W.* vol. xxx. pp. 1-36; 6 figs.).—As the operation of 'Yema' grafting takes place when the fruit and wood are ripening, the scions can be selected from vines in bearing. The scion is stripped of its leaves, and a considerable amount of woody tissue is included in cutting the bud. The scion is then dovetailed into a corresponding section made in the side of the stock. This is clearly shown in the illustrations. The bud is tied in position with a few strands of raffia. The vine is mounded up with fine earth to a height of 9 inches. This is removed in spring, when the stock is cut back. The stocks should be half an inch in diameter and the node of the scion should be of equal diameter.—*S. E. W.*

Grapes, European, in Eastern America. By Dr. U. P. Hendrick (*Am. Pom. Soc.* 1917, pp. 46-51).—An experiment in grafting European varieties of *Vitis vinifera* on American stocks. Abundant growth has been made, and though the vines need winter protection, it is thought that their increased productiveness will more than make up for the cost.—*A. P.*

Grapes, The Muscadine—their Culture and Uses. By Charles Dearing (*Am. Pom. Soc.* 1917, pp. 52-59; 12 plates).—Hitherto the standard varieties have been practically self-sterile, but a new race has been recently introduced, which is self-fertile and capable of setting as fruit 25, and even, in some varieties, 50 per cent. of their blossom buds, as against a normal 15 per cent. with the old varieties. Seven thousand seedling vines are now growing in the breeding plots, and improvements are being effected in various directions.—*A. P.*

Grass on Trees, Experiments on the Action of. By Spencer U. Pickering, M.A., F.R.S. (*Woburn*, 17th Report, 1920, pp. 1-6; 1 fig.).—Some experiments are described, supplementary to those published in previous reports, showing that the action of grass on fruit-trees is practically the same, whether the grass is grown in earth or sand, and is independent of the thoroughness with which the grass-roots are separated from the tree-roots (pp. 1-4). Half the plantation of Standard Bromley's Seedling planted twenty-two years previously was grassed over with the result that the crops were reduced by 5 per cent. in the first season and by 50 to 90 per cent. in the second season, the subsequent removal resulting in no definite recovery of vigour during the third season (pp. 4-6).—*A. P.*

Hamamelis vernalis. By L. Chenault (*Rev. Hort.* vol. xcii. p. 47; 2 figs.)—This *Hamamelis* is widely distributed in the States of Missouri, Arkansas, and Louisiana. It is about 6 feet high. The leaves are bluish green on the upper surface and pale green underneath. In January it is covered with axillary groups of sweet-scented, reddish brown flowers.—S. E. W.

Hardiness. By C. B. Waldron (*Iowa State Hort. Soc. Rep.*, 1918, pp. 115-119).—Selection does not appreciably affect the hardiness of plants. Early maturity is an important factor in adapting plants to a cold climate. Exposure to frost removes moisture from plant cells and deposits it in the form of ice in the intercellular spaces. In order that a plant may survive the winter, it must retain sufficient moisture to enable it to resume activity in spring. Protection is afforded by wind screens and by mulching, which delays freezing about the roots. Hardy hybrids can only be produced when at least one of the parents is hardy.—S. E. W.

Haworthia Chalwini Matloth et Berger. By C. H. Wright (*Bot. Mag.* t. 8828; Dec. 1919).—A curious columnar plant with fleshy purplish-brown white-warted imbricate leaves. Suitable for cultivation in the succulent house and native of S. Africa.—F. J. C.

Hawthorns as Hosts of Apple, Pear, and Quince Pests, Wild. By W. H. Wellhouse (*Jour. Econ. Entom.* 13, Oct. 1920, pp. 388-391).—The author states that 374 species of insects are known to feed on Hawthorns, of which 210 species are found in the United States. Six species of serious pests of Hawthorn in the States may at any time be expected to become pests of cultivated fruits.

Over one hundred species feed on both Apple and Hawthorn, of which a list of over twenty-five is given in the text.

Not only do Hawthorns act as native hosts for insects, but also for cankers, blights, and rusts. It is suggested that either these plants be abolished as hedge plants, or that they be sprayed together with the orchards.—G. F. W.

Heracleum persicum giganteum. By A. Van den Heede (*Le Jard.* vol. xxxiv. p. 133; 1 fig.).—The largest and most ornamental of the Umbelliferae is *Heracleum persicum giganteum*. Its large digitate leaves exceed a yard in length and half a yard in width. In spring the rate of growth is amazing; it attains a height of 10 feet and is surrounded by an umbel of snow-white flowers, 3 feet wide. The plant thrives in deep rich soil and is easily raised from seed.—S. E. W.

Hoheria populnea var. *lanceolata* Hooker. By W. J. Bean (*Bot. Mag.* t. 8843; June 1920).—Hardy in the south of England, where it forms a graceful and attractive late-flowering tree, but needing a greenhouse near London. The foliage is narrower than in the type and the white flowers rather smaller.
F. J. C.

Hop, Forms of, Resistant to Mildew. By E. S. Salmon (*Ann. Appl. Biol.* vol. v. Nos. 3 and 4, April 1919, pp. 252-260).—Certain seedlings of the wild hop are persistently immune to the attacks of mildew when grown in the greenhouse. Other seedlings under the same conditions and of the same parentage are very susceptible. Certain of the immune seedlings are also resistant in the open air under normal cultural conditions, while others are susceptible in the hop garden. The change in immunity is apparently associated with the changes in temperature.
R. C. S. R.

Hydrocyanic Acid, Fumigation with Liquid. By H. J. Quayle (*U.S.A. Exp. Stn. California, Bull.* No. 308, June 1919, pp. 393-407; 4 figs.).—This highly poisonous chemical was first used experimentally in 1916, and on a commercial scale in 1917 for fumigating Citrus trees in California.

It is a colourless liquid, less than three-fourths the weight of water (Sp. G. 0.6969 at 18° C.), boiling at 26.5° C., highly volatile, the gas being quickly given off from the surface of the liquid, and its use is therefore attended with very great danger to the operator. Pot generators kill best at the bottom of the tree, but the liquid at the top; 20 c.c. of liquid HCN (96-98 per cent.) equal 1 ounce of sodium cyanide as it is generally used.—G. F. W.

Ilex verticillata A. Gray. By W. J. Bean (*Bot. Mag.* t. 8832; March 1920).—This American deciduous holly is well known in English gardens. It is particularly valuable when it bears its bright scarlet berries (to induce the production of which it requires full exposure to the south). There is a variety with yellow fruit called *chrysocarpa*.—F. J. C.

Inobulbum munificum. By J. Poupion (*Rev. Hort.* vol. xcii. pp. 64-66; 2 figs.).—*Inobulbum munificum* Kranzlin and *Dendrobium muricatum* Finet from Noumea and New Caledonia are identical. It thrives under the same conditions as *D. senile*. Finet's opinion that there are two varieties of this orchid is incorrect.—S. E. W.

Insect Powder. By McDonnell, Roark, and Keenan (*U.S. Dep. Agr., Bull.* 824, June 3, 1920, pp. 1-100; 4 plates).—Investigations were undertaken into the composition of insect powders on account of suspected adulteration.

The Insecticide and Fungicide Board of the U.S. Department of Agriculture recognizes as insect powder an insecticide made from the powdered heads of the following: *Chrysanthemum* (*Pyrethrum*) *cinerariaefolium* Bocc., *C. (P.) roseum* Web. and Mohr., and *C. Marshalli* Aschers. (*P. carneum* M.B.). The history of the use of insect powders is given, and is followed by notes on the cultivation and harvesting of the flowers, which are commercially grown in Dalmatia, Japan, Australia, Algeria, and California, the first three named being the most important for international trade.

Adulteration is common, and substances, such as lead chromate, curcuma, yellow ochre, and flowers of Ox-eye daisy, etc., are substituted, the last named occurring as a mixture or alone.

The ground stems of the plants constitute over 95 per cent. of the adulterants used, and they are of little use as an insecticide.

Twenty microphotographs are given as an aid to detection of adulterants, but this method, as yet, is inadequate to make an accurate determination possible. Physiological and chemical means of detecting adulteration appear to be the comparison of the sample to be tested with a known genuine sample.

A formula, developed from the data of several hundred samples tested, is given by which it is possible to determine in an insect powder the approximate amount of added *Pyrethrum* stems present.

Pp. 83-100 are devoted to a very complete bibliography.—G. F. W.

Insect Visitors to Fruit Blossoms, Notes on. By C. H. Hooper (*Jour. Pomology*, vol. i. no. 2, pp. 116-124).—Some few notes are given on insect visitors to orchard and bush fruits. It is intended as a preliminary list, so that some scientific worker may take up this most important economic subject.

According to D'Arcy W. Thompson's translation of Hermann Müller's "The Fertilisation of Flowers," the numbers of different insects visiting fruit blossoms are as follows: Apple (16), pear (31), plum and cherry (14), raspberry (17), black currant (1), red currant (5), gooseberry (13), strawberry (25), and blackberry (68).—G. F. W.

Insecticide Investigations. By A. L. Lovett (*U.S.A. Exp. Stn. Oregon, Bull.* 169, April 1920, pp. 5-55).—The results of spraying tests, started in 1914 by Professor H. T. Wilson, are described.

With the help of fifteen tables and a concise summary, the results are made plain. Lead hydrogen arsenate (acid lead arsenate) has a higher killing power than basic lead arsenate, probably on account of its higher percentage of arsenic, and a higher proportion is assimilated by caterpillars; but it is liable to burn foliage where free arsenious acid is present.

All the arsenic is not assimilated by caterpillars, but a part of it passes through the digestive tract in the excrement.

Three pounds of lead arsenate to 200 gallons of water was an effective spray for the early control of codling moth, and should be applied as a fine spray.

Powdered forms are superior to paste forms, especially when one is far removed from the manufacturers.

Much useful information is given of the value of "spreaders," the most efficient being casein, gelatine, glue, soap bark or saponin, and oil emulsion.

Nicotine acts as a repellent for tent caterpillars, as they will not usually feed on foliage sprayed with it.

The author recommends nicotine sulphate as an ovicide for codling-moth eggs, the addition of soap rendering it practically perfect in this respect.

G. F. W.

Ipomaea Pes-tigridis var. longibracteata Linn. By S. A. Skan (*Bot. Mag.* t. 8806; June 1919).—Native of Ugogo, etc., East Tropical Africa. The flowers, produced in a warm house, are infundibuliform, white, about 2½ inches in diameter. The plant is an annual.—F. J. C.

Iris Hoogiana Dykes. By O. Stapf (*Bot. Mag.* t. 8844; June 1920).—Introduced by Mr. C. G. van Tubergen from Turkestan. It produces lavender flowers with a rich golden beard in May, and, like others of its section, requires to be lifted about the middle of July.—*F. J. C.*

Iris Reichenbachia Heuffel. By O. Stapf (*Bot. Mag.* t. 8812; Sept. 1919).—Macedonia. This plant has proved quite hardy at Kew. It is dwarf, and produces its flowers, which vary from red-purple to greenish yellow, in May. It is easily distinguished when in flower from *I. Chamæiris* by its sharply keeled spathe valves.—*F. J. C.*

Kochia scoparia var. *trichophila*. By O. Stapf (*Bot. Mag.* t. 8808; Sept. 1919).—This form of *Kochia scoparia*, which turns red somewhat suddenly in autumn, is now fairly well known in gardens for summer bedding, although introduced only in 1901 by Messrs. Cannell. A coloured figure, description, and history of the plant in cultivation are given.—*F. J. C.*

Lantana Fly. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxx. pp. 665-668; 1 plate).—The Lantana is a well-known pest in certain districts in New South Wales. It is attacked by the Lantana Fly (*Agromyza lantanae*) whose grubs destroy the fertility of the seed. It is only recently that the fly has been observed in the neighbourhood of Sydney. It appears to be identical with the fly from Hawaii.—*S. E. W.*

Larkspur. By C. D. Marsh, A. B. Clawson, and H. Marsh (*U.S. Dep. Agr., Farmers' Bull.* 988, pp. 1-15; 6 figs.).—In the western states of Canada and the United States many cattle are lost by poisoning through eating larkspurs, although sheep and horses grazing on the same land do not suffer. The tall larkspur, *Delphinium Barbeyi*, abounds in the mountains of Wyoming, Montana, Utah, and Colorado, and *D. cucullatum* is prevalent in Montana. The low-growing varieties, *D. Menziesii* and *D. bicolor*, also flourish on the mountains, and the white-flowered *D. virescens* is found in the plains east of the Rocky Mountains. The plants are most poisonous before they reach maturity. Cases of poisoning are rare after the middle of August. Cattle may eat 3 per cent. of their weight of larkspur with impunity. They should be kept out of the poison areas until the plants have matured, and the larkspur should be eradicated where it grows in masses. Sheep will destroy the low-growing larkspur, but will not touch the tall variety.

The poisoned cattle fall down, suffer from constipation, and in severe cases die from paralysis of respiration. The poisoned animal should be kept as quiet as possible and turned with its head uphill. A subcutaneous injection of Physostigmin salicylate (1 grain), Pilocarpin hydrochloride (2 grains), and Strychnine sulphate, dissolved in 4 drams of water, is administered in the shoulder.—*S. E. W.*

Larkspurs, Chemical Examination of Three Species of. By O. A. Beath (*U.S. Agr. Exp. Stn. Wyoming, Bull.* No. 120, June 1919, pp. 54-88; 11 figs.).—Three species of larkspurs (*Delphinium glaucescens* Rybd., *D. Barbeyi* Huth., and *D. Geyeri* Greene) are commonly found in Wyoming, Montana, and Idaho, at an elevation of 7,000 feet on mountain-sides. Because of their numerous green leaves appearing during the dry summer, live-stock frequently graze upon them. The plants being poisonous, great losses of cattle occur. Examination of the various species of *Delphinium* were made to determine the amount of alkaloids in the plant at various stages of its life-history. It was found that extracts of the leaves of *D. Geyeri* and *D. Barbeyi* were more active than those of the stems and flowers, and that extracts from immature plants were three or four times more effective than extracts from mature plants. The poisonous substances could be completely extracted with water. Three distinct amorphous alkaloids are present in the plant as well as one crystalline alkaloid.—*A. B.*

Laurocerasus schipkaensis and **Pyracantha pauciflora**. By F. Morel (*Rev. Hort.* vol. xcii. pp. 80-81).—A hybrid of the Caucasian Cherry Laurel with *L. schipkaensis* is much harder than the Caucasian variety. Plants raised from the seed of *Pyracantha pauciflora* rivalled *P. coccinea Lalandi* in splendour and can resist severe frosts which are fatal to the latter.—*S. E. W.*

Lemons, Curing of (*Agr. Gaz. N.S.W.* vol. xxx. p. 639).—Lemons will keep for six months if they are vaselined and packed in paper cases.—*S. E. W.*

Light Traps, Lepidoptera at. By W. B. Turner (*Jour. Agr. Res.* xviii. pp. 475-481, Feb. 1920; 1 fig.).—A further contribution to the author's previous work in xiv. pp. 135-149. A description is here given of the trap. Collections were made on twenty-eight nights between May 14 and September 13, 1918, when 3,152 moths were caught, embracing over sixty species, of which 2,200 or 69.8 per cent. were males, and 952 or 30.2 per cent. were females.

Five tables are given enumerating the results, together with meteorological data.—G. F. W.

Lilium Farreri Turrill (*Bot. Mag.* t. 8847; June 1920).—A beautiful species allied to *L. Duchartrei*, hardy, and distinguished by its linear lanceolate cauline leaves dispersed throughout most of the stem, and relatively small Martagon-like flowers, the white segments of which are spotted with dark-purple spots. Seed collected by Mr. Farrer in Kansu.—F. J. C.

Liming Soil. By E. C. Shorey (*U.S.A. Dep. Agr., Farm. Bull.* 921; 29 pp., 5 figs.).—It is well known that liming improves the physical condition of heavy soils, neutralizes acidity and facilitates the decomposition of organic matter. The lime can be applied in the form of quicklime, slaked lime, or as finely powdered chalk or limestone. Where the soil is light and deficient in humus, liming must only be carried on in conjunction with green-manuring.—S. E. W.

Liparis macrantha Rolfe (*Bot. Mag.* t. 8797, June 1919).—A native of Formosa, introduced by Mr. H. J. Elwes and flowered at Colesborne, this species produces a long spike of brownish-purple flowers with segments $\frac{1}{2}$ to $\frac{3}{4}$ inch in length and very large for the genus. It thrives in conditions suiting Indian *Calanthes*. F. J. C.

Logan Blackberry. By G. M. Darrow (*U.S. Dep. Agr., Farmers' Bull.* 998, pp. 1-24; 11 figs.).—The Loganberry is a variety of Blackberry, not a hybrid. It requires a deep, well-drained soil rich in humus. The young plants produced from the rooted tips of the old canes require more care than ordinary seedlings or cuttings. They are planted 8 feet apart in rows 8 feet distant, and the canes are trained on a wire trellis. After fruiting, the old canes are cut down to the ground. Weak canes are also removed. The berries may be canned, dried, or made into jam. There is also a growing demand for the bottled juice, which forms a pleasant beverage when diluted with three times its bulk of water. The Laxtonberry and the Mahdi are hybrids of the Logan and the Raspberry.

S. E. W.

Lonicera chaetocarpa Rehder. By W. B. Turrill (*Bot. Mag.* t. 8804; June 1919).—Related to *L. hispida*, of which it was regarded as a variety. It was introduced by Mr. Wilson from W. China, is hardy, and forms a neat rounded bush. It is one of the best of the shrubby honeysuckles, and bears primrose-yellow flowers somewhat like those of a *Diervilla* in June.—F. J. C.

Lonicera similis var. *Delavayi* Rehder. By W. B. Turrill (*Bot. Mag.* t. 8800, June 1919).—Originally described by Franchet as *L. Delavayi*, this native of S.W. China was introduced by MM. de Vilmorin. Its long-tubed yellow flowers are produced in late August, and, as it is a perfectly hardy evergreen climber at Kew, it should prove a useful addition to our gardens.—F. J. C.

Maize, Insect Pests. By W. B. Gurney (*Agr. Gaz. N.S.W.* vol. xxix. pp. 641-650; xxx. pp. 196-202; 15 figs., 1 col. plate).—The most destructive of the insect pests of maize are described, with illustrations, viz. the Grain Weevil (*Calandra oryzae*), Angoumois Grain Moth (*Ditroctroga cerealella*), Yellow Maize Moth (*Conogethes punctiferalis*), and Corn Earworm (*Chloridea obsoleta*). The Pink Cornworm (*Batrachedra rileyi*) attacks the ears of the maize in the field and in store. It is not possible to control this pest in the growing crop, but it can be effectually dealt with by fumigating the harvested cobs with carbon di-sulphide. The inconspicuous moth is grey. The pink caterpillar is $\frac{3}{4}$ of an inch long.

The Army Worm (*Cirphis unipuncta*) attains a length of $1\frac{1}{2}$ inches. It is dark brown or black in colour. The moth is rarely seen, as it flies at night. It has a light spot on the fore wing; the prevailing colour is buff. Winter cultivation of the soil exposes the pupæ to birds and to frost. If in early spring the young caterpillars are discovered in the weeds and grass near the maize fields, the infested patches must be cut down and burnt. When the Army Worms move in mass in a definite direction they may be trapped by ploughing a steep furrow in the line of their advance. They can then be crushed or sprayed with oil emulsion. If the caterpillars infest the crops, they may be destroyed by

scattering poisoned bait amongst the corn. The bait consists of white arsenic or Paris green and bran (1:16) made into a paste with molasses or water, to which minced oranges or lemons are added.—S. E. W.

Maize Pests. By F. H. Dudley (*Dep. Agr. Augusta, Maine, Bull.* vol. xviii. No. 1, pp. 27-30).—The four most injurious pests to Indian Corn are the European Corn Borer (*Pyrausta nubilalis*), the Bollworm (*Heliothis obsoleta*), the Common Cornstalk Borer (*Papaipema nitela*), and the Salt Marsh Caterpillar (*Estigmene acrola*). The European Corn Borer hatches two broods annually. They eat their way into the cornstalks, where they winter. If all the corn fodder is fed out or put in a Silo and all weeds destroyed, this pest may be exterminated. As the Bollworm winters in the soil, deep ploughing in the late autumn will destroy them if the winter is severe. The Common Cornstalk Borer is hatched in spring from autumn-laid eggs in grass-lands. All grass adjoining the maize fields should be mowed and given to cattle or burned. The Salt Marsh Caterpillar, or Woolly Bear, can only be dealt with by hand-picking.—S. E. W.

Malus rivularis Roemer. By W. J. Bean (*Bot. Mag.* t. 8798, June 1919).—The only species of crab native west of the Rockies, this is nearly related to *M. Toringo*. It produces ellipsoid fruits from which the calyx falls away, and is worth cultivating as an ornamental tree for them. It was introduced by David Douglas, but has never become common although quite hardy and vigorous. In a wild state it grows in moist, deep, rich soil, forming a tree up to 40 feet.

F. J. C.

Mangos Cultivated in Florida, The Natural Groups of. By Wilson Popenoe (*Am. Pom. Soc.*, 1917, pp. 70-81; 5 plates).—The principal diagnostic characters of six groups are described and the varieties belonging to each enumerated, their country of origin being shown.—A. P.

Mesembryanthemum nobile Haw. By R. A. Rolfe (*Bot. Mag.* t. 8814; Sept. 1919).—Native in Cape Colony. A greenhouse species with large golden-yellow flowers and few long fleshy glaucous leaves covered with green spots.

F. J. C.

Metrosideros collina A. Gray. By R. A. Rolfe (*Bot. Mag.* t. 8846; June 1920).—A Polynesian species hardy in Scilly, forming a tree up to 60 feet high, with leathery elliptic or roundish leaves about 1½ to 2½ inches long, and red flowers.—F. J. C.

Muscadine Grape Paste. By C. Dearing (*U.S. Dep. Agr., Farmers' Bull.* 1033, pp. 2-13).—The pulp obtained as a by-product in making jelly is freed from seeds by passing through a colander. It is mixed with half its weight of sugar and boiled in a shallow pan with constant stirring until the mass is so stiff that it will not readily flow together when separated. It is then poured out on a marble or china surface to form a slab half an inch in thickness. After twelve hours it is cut in portions one inch square. The squares are rolled in powdered sugar and left to dry. It may be coated with sugar icing or covered with chocolate. The plain paste may be spread on bread. Similar fruit pastes can be made from apples, pears, guava, strawberries, raspberries, and blackberries.—S. E. W.

Mushrooms, A Brown Blotch Disease of Cultivated. By Sidney G. Paine (*Ann. Appl. Biol.* vol. v. Nos. 3 and 4, April 1919, pp. 206-219; figs.).—Symptoms of the disease are described. The causal organism is a small bacterial parasite which may possibly be identical with the organism which produces pear-blossom blight.—R. C. S. R.

Novelties. By M. Garnier (*Rev. Hort.* vol. xcii. pp. 34, 35, 55, 56; 4 figs.).—*Amaranthus* 'Crête de Coq chamoisée,' flowers, brilliant salmon pink to reddish pink. *Impatiens Balsamina* 'Fleuri rouge,' brilliant scarlet flowers, opening in July, double. *Canna florifera*, a fine large red-flowered variety raised from seed of C. 'Oiseau de feu.' Single yellow Wallflower, a vigorous variety with large sweet-scented flowers. *Gloxinia* 'France,' large garnet-red velvet flowers with a slender red-purple edging. *Heliotrope* 'Souvenir' is covered with umbels of large violet flowers throughout the summer. Sweet William 'Adrianople,' brilliant colour. Petunia 'Roi des Parterres varié,' numerous flowers, varying from white to purple. Single pink Pyrethrum, large-flowered, comes true from seed. Hybrid Rehmannia from *R. angulata* and *R. Henryi*

bears large white flowers with purple spots. Double Hollyhock, salmon yellow. Gloxinia-flowered Salpiglossis, height $2\frac{1}{2}$ to 3 feet, very floriferous red velvet flowers. Anemone-flowered China Aster, petals cream white, centre cream yellow. Cyclamen 'Perle de Saint Germain mauve,' fimbriated flowers resembling a *Cattleya*. *Myosotis* 'Elegant,' double pink blooms which remain in flower a long time. Perpetual-flowering Carnation 'Rubis,' bright red. *Begonia semperflorens* 'Le Cygne,' bears groups of white flowers with slightly waved edge. Dwarf Hybrid Petunia, compact habit and large flowers. Perpetual-flowering Carnation 'Papa Auda,' scarlet flowers on stiff stalks. Verbena 'Manteau de Pourpre,' rich violet purple. China Aster 'Maréchal Joffre,' compact, semi-dwarf habit, bearing numerous small single flowers of a red-purple colour with a golden disc.

Vegetables: Early Turnip 'Croissy,' white roots, 8 inches long. Early Pea 'Roi des Gourmands,' curved pods. Potato 'Gros de Gâtinais,' large cropper, rich in starch. Dwarf Haricot 'Métis beurre,' yellow pods, is gathered green. Beetroot 'Modèle red globe.' Cabbage 'Copenhague,' solid round heads on short stalks, early. Butter Bean 'Bountiful,' long green pads, not stringy. Tomato 'Soleil levant,' scarlet, smooth skin, does not crack. Cardoon 'Blanc amélioré,' thornless, blanches quickly. Early Pea 'Serpette Merveille' is an improvement on 'Serpette Express.'—S. E. W.

Nuphar polysepalum Engelm. By T. A. Sprague (*Bot. Mag.* t. 8852, Sept. 1920).—This yellow-flowered water-lily is a native of mountain lakes of Colorado, and has larger flowers than any other *Nuphar* and nine instead of six petaloid sepals. It is of slow growth and apparently difficult to establish, though it has now flowered at Glasnevin.—F. J. C.

Odontoglossum cristatum Lindl. By R. A. Rolfe (*Bot. Mag.* t. 8809; Sept. 1919).—Discovered by Hartweg when collecting for the R.H.S. in Ecuador about 1840. Introduced later by Linden. It is a more slender plant than *O. crispum*, and has yellow flowers about two inches across, with brown spots and flushed with brown at ends of segments.—F. J. C.

Olives, The Ripening and Pickling of Californian. By R. W. Hilts and R. S. Hollingshead (*U.S.A. Bur. Pl. Ind., Bull.* 803, Jan. 1920, pp. 1-24; 5 plates).—The results of the investigations indicate that the best index of maturity for olives both fresh and pickled is the percentage of oil in the fruit. The minimum oil content of 17 per cent. is offered as a tentative standard for maturity for 'Mission' olives and other common varieties except the 'Manzanillo' (minimum 15 per cent.), the 'Ascolano,' and the 'Sevillano.' Because of the great variations in the composition of olives of the same variety grown in different localities, it is never practicable to set up definite and fixed minima for oil in mature olives, and the proposed standards must be applied with caution. The detection of gross frauds of immature olives being pickled and coloured to resemble ripe olives may be determined by using these tentative standards.—A. B.

Onion Diseases and their Control. By J. C. Walker (*U.S.A. Bur. Pl. Ind., Bull.*, pp. 1-24; 12 figs.).—The various fungus diseases of the onion may be divided into those diseases met with in the beds, e.g. smut, mildew, leaf-mould, fusarium, root-knot; and those important in storage and in transit, e.g. neck rot, soft rot, fusarium, black mould, smudge. In addition there are various diseases due to insect pests.

Onion smut (*Urocystis Cepulae*) appears as the seedlings come above the ground, and causes brown to black blisters to form in the scales or leaves, and black powdery masses of spores are then produced. Most of the seedlings die in two or three weeks. If they can become 4 inches high they may survive, and if transplanted may develop into bulbs. The control measures include destruction by fire and treatment of soil with formaldehyde solution.

Onion blight (mildew) forms a furry violet mass on leaves and stem, and may spread over the whole plant, especially in damp weather. The causal organism is *Peronospora Schleideni*, and is an external parasite. The control measures include suitable rotation of crops and efficient drainage.

Leaf-mould (*Macrosporium parasiticum*) is of minor importance. Fusarium rot (*F. spp.*) attacks field plants but develops rapidly in storage onions. Root-knot is due to attacks of eelworms (*Heterodera radiculicola*) and may be generally avoided by suitable crop rotation.

Storage Diseases.—Neck rot caused by *Botrytis* spp. is most destructive and widespread in storage onions. The fungus is a mould which reproduces by

spores and sclerotia, and its ravages may be best controlled by avoidance of dampness. White onions are especially susceptible to this disease. Soft rot is a bacterial disease similar in its effects to *Bacillus carotovorus* on the carrot. Black mould is caused by *Aspergillus niger*, and smudge (*Colletotrichum circinans*) is found chiefly upon white onions.

In general, storage diseases are controlled by careful sorting, protection from rain after harvest, thorough curing, and storage in a well ventilated, dry warehouse at 32° to 35° F.—A. B.

Onopordon illyricum var. Cardunculus. By E. Lemée (*Rev. Hort.* vol. xcii. p. 5).—This giant thistle (8 feet in height) was raised from seed collected in the neighbourhood of Salonica. For six weeks in late summer it bears innumerable purple flowers. Its handsome appearance gains this hardy plant a place in parks or large gardens.—S. E. W.

Passion Vine Longicorn Beetle. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxx. pp. 37-39; 2 plates).—The Longicorn Beetle (*Monohammus fistulator*) has done much injury to the Passion Vine in certain districts in New South Wales. The beetles are dark brown in colour and are thickly covered with yellowish grey hairs. The average length of the beetle is one inch. The dull white pupæ are found in the stems and the swollen base of the vines. As the eggs are deposited on the main stems, it is suggested that painting the stems with lime-sulphur wash in late October may check the damage, or suspicious spots on the stems may be probed with an awl to destroy the larvæ.—S. E. W.

Pavetta abyssinica Fresen. By J. Hutchinson (*Bot. Mag.* t. 8838; March 1920).—A native of Abyssinia and Uganda, this species bears an inflorescence, 5 inches across, of long-tubed white flowers. It reached a height of 6 feet in the tropical house at Kew before it flowered. Its leaves are about 6 inches in length.
F. J. C.

Peach Buds, Index of Hardness in. By E. S. Johnston (*Amer. Jour. Bot.* vol. vi. No. 9, Nov. 1919, pp. 373-379; 2 figs.).—Attention is called to two points in these observations. *First*, there is a marked seasonal increase in the water-content of fruit buds of the 'Elberta' and 'Greensboro' peaches, whether individual trees or averages are considered. *Second*, with the advance of the season, the differences between water-content of fruit buds of the above varieties become more marked, that for the 'Elberta' being the greater. The 'Greensboro' is considered more hardy with regard to winter injury and to the fact that the ratio of water-content to dry weight of fruit buds is much less than that of the 'Elberta.' Early spring is the critical time, since the water-content of the buds increases very rapidly.—A. B.

Peach Tip Moth. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxx. pp. 891-892).—Much damage to Peach trees is caused by the Peach Tip Moth (*Laspeyresia molesta*). Bandaging the trees as for Codling Moth is more effectual than spraying.—S. E. W.

Peaches. By H. P. Gould and F. Andrews (*U.S.A. Dep. Agr., Bull.* 806).—This paper gives statistics of peach production in the different States of America and mentions the chief varieties grown.—S. E. W.

Pear Harvesting and Storage Investigations in Rogue River Valley. By C. I. Lewis, A. E. Murneek, and C. C. Cate (*U.S.A. Exp. Stn., Oregon, Bull.* 162, July 1919; 12 figs.).—As a result of a statistical study of the increase in size of Bartlett pears it was found that this fruit increases gradually in linear measurements throughout the growing season, so that the ratio in volume steadily rises as the season progresses. A preliminary investigation has been made with a pressure test as a means of indicating the maturity of fruit at the time of picking, and it is thought that satisfactory results may be expected from its adoption. A steel ball seven-sixteenths of an inch in diameter, half imbedded in a block of hard wood, was used to puncture the fruit, the amount of pressure required to push the ball into the pear until the latter reaches the block being registered in pounds on a spring scale.—A. P.

Pear 'Passe-Crassane.' By V. Enfer (*Rev. Hort.* vol. xcii. pp. 88, 89).—This pear succeeds when grafted on Quince and on the Pears Beurré Diel and the Curé. In pruning it is necessary to cut back to strong buds, but not to be too drastic.—S. E. W.

Peas, Heat-Resistant Organisms in Cold-Packed Tinned. By R. Normington (*U.S.A. Exp. Stn. Mich., Bull.* 47, Nov. 1919, pp. 1-34).—A careful bacteriological examination of numerous tins of preserved peas which had "swollen," showed that all the organisms present were spore-forming bacteria, and these could withstand 10 to 15 lb. pressure in the autoclave for ten to twenty minutes. Seven of the bacteria could cause peptonization in milk, and nearly all them could reduce starch to sugar. *B. subtilis*, *B. ramosus*, *B. ruber*, *B. prodigiosus*, and *B. viscosus* produced gas in peas but not in other media. A chemical examination of the spoiled peas showed the presence of creatinin and ammonia. Most of the bacteria are soil bacteria and are probably introduced into the vessels from earth on the seeds or pods. Cleanliness is obviously the remedy for such losses. A short bibliography is appended.—*A. B.*

Peas, The Black Hilum of. [Observations faites à Verrières par Philippe de Vilmorin sur le caractère 'Hile Noir' chez le Pois.] By A. Meunissier (*Jour. Gen. x.* pp. 53-60; July, 1920).—Seven types of peas with a dark hilum were grown and the behaviour of the seedlings as regards this character is recorded. *F. J. C.*

Plant Growth, The Effects of Certain Organic Compounds on. By M. J. Funchess (*U.S.A. Exp. Stn. Alabama, Bull.* No. 191, June 1916, pp. 101-132; 8 plates).—The causes of fertility or infertility of soils are usually explained in terms of plant food or physical condition of the soils. Unproductive soils were held to be deficient in some element necessary for plant growth, and this could be remedied by applications of fertilizers.

In recent years, however, the theory that injurious substances harmful to plant growth, rather than deficiencies of plant food, are the actual cause of unproductive soils has been advanced by the Bureau of Soils, U.S. Dep. of Agriculture. These harmful substances are root excretions or products resulting from organic decompositions in the soil. Therefore, to restore fertility to such soils, the injurious compounds must be removed or rendered harmless. Experiments have been made and the following conclusions arrived at:

(1) Poor soils are not benefited by application of carbon black, pyrogallol, or calcium carbonate.

(2) Coumarin and vanillin when added to soils are toxic to plants only in large amounts, and when these large amounts are applied at seedling time.

(3) Nitrogenous compounds like pyridine and quinoline are beneficial rather than harmful, and the beneficial effects are increased if potassium and phosphorus are added. This is due to the increased effect of asparagin, nucleic acid, and nitrate of soda.

(4) Normal soils are able to dispose of enormous quantities of organic compounds through physical, chemical, and bio-chemical action.

(5) Soils very deficient in nitrogen are not much benefited by addition of lime, phosphorus, or potassium. Nitrogen alone is much more effective than a combination of these compounds.—*A. B.*

Plants, Experiments with Soft-Wooded. By Spencer U. Pickering (*Woburn, 17th Report, 1920, pp. 7-76; 2 figs.*).—Soft-wooded plants were subjected to the action of the surface growth of grass and other plants, and the conclusion was arrived at that the deleterious effect of one crop on another is a general action applying to all plants alike, from which it follows that the growth of any plant must be affected to a certain extent by the toxin which it itself forms (pp. 7-29). The nature of the toxin is still unknown. There is no reason to assume that it is an exudation from the roots, but it may be a constituent of the debris of the growing roots, soluble and easily oxidizable to a plant food, but toxic before it is oxidized. The effect of grass on trees is but a particular instance of the action of one crop upon another, and it has been demonstrated that trees have a similar effect upon grass and other crops, the action in the case of Brussels sprouts not being explicable by the shading of the ground or the exhaustion of the soil (pp. 32-36).

The toxic action of one plant on another plays a prominent part in the behaviour of similar plants when massed together. With plants of the same age grown in pots it was found that the amount of plant growth produced where the mass of soil available was below a certain limit was independent of the number of plants grown, *i.e.* the weight of individual plants was proportional to the area occupied by them. If, however, some of the plants were younger than the others the total growth produced might be as much as 20 per cent. below the maximum possible in the limited mass of soil, a result held to be due to the action of toxicity produced by the older plants preventing the younger ones

utilizing all the nutrient present (pp. 37-58). Where the soil available per plant is not kept constant, as happens in the case of plots of plants in a field, the outside rows have been found to be stronger than the inside up to an excess of 100 per cent., a superiority not attributable, as generally supposed, to the extra food procurable, but to the fact that they were less affected by the toxic action of the neighbouring plants than were the inner rows (pp. 59-68).—*A. P.*

Plants, The Upward Translocation of Foods in Woody. By O. F. Curtis (*Amer. Jour. Botany*, vol. vii. Nos. 3 and 7, March and July 1920, pp. 101-124, 286-295).—It is a general belief that in shrubs and trees there is a storage of organic matter in the lower part of the trunk and in the roots, and that, as growth starts in the spring, this food becomes soluble and passes upward through the xylem to the growing shoots and leaves. In order to determine definitely whether the upward translocation of food takes place primarily through the phloem or xylem, the author conducted a series of experiments with *Philadelphus pubescens*, *Pyrus Malus*, *Ligustrum ovalifolium*, *Crataegus* sp., *Acer Saccharum*, and *Fagus grandifolia*, and arrives at the following conclusions:

Defoliated stems, from which a ring of tissue extending to the cambium is removed, cease growth. This cessation is due to the inability of the xylem to carry the necessary food which is required, not merely for the supply of energy and building fresh tissues, but to increase the osmotic concentration of the tissues to enable them to absorb water. This food consists of carbohydrates. If the stem above a ring is not defoliated the leaves are able to supply sufficient food to allow for considerable growth. If dormant stems are ringed the growth above the rings ceases soon after the starch supply is depleted and the greater the supply of starch above a ring the longer will growth continue. The carbohydrates stored in the xylem below the ring cannot be removed through the xylem but are transferred radially to the phloem, where they may be carried downward if there is no second ring below. The carbohydrates of the xylem between two rings remain there at least for some time after those above the upper ring and those below the lower ring have been mostly removed. Although large amounts of carbohydrates are stored in xylem tissues, there is no appreciable longitudinal transfer of sugars through these tissues.—*A. B.*

Pleurothallis grandis Rolfe (*Bot. Mag.* t. 8853, Sept. 1920).—A native of Costa Rica, with large curiously striped flowers, requiring an intermediate house and thriving in peat and sphagnum.—*F. J. C.*

Pleurothallis punctulata Rolfe (*Bot. Mag.* t. 8839; March 1920).—An epiphytic species from New Granada of which only one plant is known. Its curious flowers, through the twisting of the petiole, face the lower side of the grey-green leaves. It flowered along with *Masdevallias* at Kew.—*F. J. C.*

Plum Trees, A "Wither Tip" of. By H. Wormald, M.Sc., A.R.C.Sc. (*Ann. Appl. Biol.* vol. v. No. 1, July 1918, pp. 28-59; figs.).—(a) General observations; (b) the fungus under heads of—annual cycle, cultural studies, dimensions of the conidia, and identity of the fungus; (c) inoculation experiments—of plum leaves, plum flowers, immature plums on trees in the plantation, and of apple flowers.

The experiments show that the particular strain of *Monilia cinerea* obtained from plum twigs is less virulent as an apple parasite than the apple blossom strain itself. Control measures suggested are removal of diseased twigs and fruit, and spraying with a solution of 1 per cent. caustic soda and 1 per cent. soft soap as a winter wash; but sprays are not recommended. Removal and burning of diseased fruit and twigs is, however, imperative.

A bibliography is appended.—*R. C. S. R.*

Podophyllum Emodi var. *chinense* Sprague (*Bot. Mag.* t. 8850; June 1920).—Distinguished from the type by its much-divided leaves and rose-coloured flowers. Native of Kansu and re-introduced by Mr. Farrer.—*F. J. C.*

Poisonous Plants. By J. H. Maiden (*Agr. Gaz. N.S.W.* vol. xxx. p. 553).—*Dichopogon Sieberianus* and the Wild Onion (*Bulbine bulbosa*) are suspected of poisoning sheep.—*S. E. W.*

Pollination, Almond. By W. P. Tufts (*U.S.A. Exp. Stn. Calif.*, Bull. 306, figs.).—Seventeen varieties of the Almond were tested, all of which proved to be self-sterile. Certain varieties were also found to be intersterile. A short list of pollenisers is given for a few varieties. Bees were found of great benefit in assisting pollination, and a method of arranging the varieties in the orchard to facilitate cross-pollination is described.—*A. N. R.*

Pollination, Plum. By A. H. Hendrickson (*U.S.A. Exp. Stn. Calif., Bull.* 310, figs.).—Seventeen varieties of Plums and Prunes were tested as to whether they are able to set fruit when self-pollinated or not, of which thirteen were found to be self-sterile, three self-fertile, and one "doubtful."

Of the five European varieties included—Clyman, Tragedy, Grand Duke, Yellow Egg, and Ponds—the four first-named were found to be self-sterile, whilst Ponds is the "doubtful" one. All five produced pollen abundantly, and were found to cross-pollinate one another successfully.

No intersterility among plums or prunes was found. Both for cross-pollination, and as an agency for distributing pollen among the self-fertile varieties, bees were found to increase the percentage of fruit-setting.—*A. N. R.*

Pollination, Prune-, The Common Honey Bee as an Agentin. By A. H. Hendrickson (*U.S.A. Exp. Stn. Calif., Bulls.* 274 and 291).—Over a series of experiments the author finds that both the French and Imperial Prunes may be aided in setting fruit by the use of bees in the orchard at blossoming time. Tables are given showing that the absence of bees in the orchard may mean a low percentage of fruit-setting with both of the varieties.—*A. N. R.*

Pollination of Bartlett Pear. By W. P. Tufts (*U.S.A. Exp. Stn. Calif., Bull.* 307; figs.).—This report gives a full account of the experiments conducted to show to what extent the Bartlett Pear is self-fertile or sterile in different localities, and to discover the best varieties to interplant for cross-pollination. It is found that this variety is self-sterile under foothill conditions, and also to a limited degree under valley conditions. All varieties tested gave satisfactory artificial germination of pollen, and it is shown that there is little variation in the amount of pollen produced by each one. No cases of intersterility among pears was found. The importance of interplanting is emphasized and varieties are quoted as being suitable for this purpose. One hive of bees to each acre of orchard is advised.—*A. N. R.*

Poppy, Flower colour and associated characters of the Opium. By H. M. Leake and B. Ram Pershad (*Jour. Gen.* x. pp. 1-20; July 1920).—A summary of observations and experimental breeding-results with the opium poppy, giving an annotated list of the factors which go to the making of flower and seed colour in that plant.—*F. J. C.*

Potato Diseases in Hawaii. By C. W. Carpenter (*U.S. Exp. Stn. Hawaii, Bull.* 45, Jan. 1920, pp. 1-42; 15 plates).—The growing of Irish potatoes in Hawaii, though an industry of great importance, has been largely discouraged in recent years by persistent crop failures and unfavourable marketing conditions. It is hoped that the island may become self-supporting in this commodity, and it is believed the potato crop could be doubled by the adoption of modern methods of cultivation. The various causes of crop failure have been largely due to poor seed, continuous cropping, unsuitable soils, and diseases and insect pests. The diseases found in Hawaii include the fusarium wilt, the late blight (*Phytophthora infestans*), *Rhizoctonia Solani*, *Sclerotium Rolfsii*, common corky scab (*Actinomyces chromogenus*), and the non-parasitic troubles—sun-scald, leaf-tip burn, hollow potato tuber, and sunburn of tubers.

The universal adoption of seed selection and disinfection, crop rotation and spraying with Bordeaux mixture are recommended as means for a general improvement in the potato cultivation.—*A. B.*

Potato Eelworm. By A. L. Lovett (*Board Hort. Rep. Oregon*, 1919, pp. 101-104; 3 figs.).—It is useless to plant potatoes in ground infested with eelworms. For three years grow crops practically not liable to attack, such as barley, maize, peanut, pearl millet, rye, wheat, Timothy or winter oats.—*S. E. W.*

Potato Leaf-Burn. By E. D. Hall (*Iowa State Hort. Soc. Trans.* 1918, pp. 335-336).—Much damage to the potato crop is done by leaf-burn, due to the attack of a small green hopper (*Empoasca mali*). Spraying the under surface of the leaves with kerosine emulsion is the best remedy.—*S. E. W.*

Potato, Streak Disease of. By W. A. Orton (*Phytopathology*, x. p. 97, Feb. 1920; figs.).—The streaky appearance appears first in the upper leaves of normally developed plants and spreads downwards by the veinlets to the stem, which eventually collapses. The author suspects the disease to be of bacterial origin, but no organism has yet been found.—*F. J. C.*

Potato Production. By G. Stewart (*Utah Agr. Coll., Circ. 40; 54 pp., 20 figs.*).—The cultivation of the potato in Utah is described. To avoid the great loss to the crop caused by *Rhizoctonia*, *Fusarium oxysporum*, scab, black stem-rot, early blight, tip-burn, and mosaic, the seed potatoes, before sprouting, are immersed in a solution of corrosive sublimate (4 oz. to 30 gallons of water) for one and a half hour, or one pint of commercial formalin to 30 gallons of water for two hours. The seed potatoes should be selected from prolific croppers.—S. E. W.

Potato Tuber, Disease of the: 'Internal Rust Spot.' By Sydney G. Paine (*Ann. Appl. Biol. vol. v. No. 1, July 1918, pp. 77-79*).—A disease of bacterial origin. From one farm at Dunstable 90 per cent. of the crop showed the disease so badly as to render it unsaleable. The tubers are perfectly hard and appear sound except for a few brown patches on the skin and a certain appearance of "scabbiness." Discoloured tissue shows on cutting. Experiments in inoculation are described.—R. C. S. R.

Potato Tuber Moth. By F. H. Chittenden (*Board Hort. Oregon, 1919, pp. 107-110; 4 figs.*).—Where fields are infested with the potato tuber moth it is advisable to cease growing potatoes in the district for one year and cultivate leguminous crops. All weeds in the neighbourhood must be collected and burned. The seed potatoes are fumigated with hydrocyanic acid in a specially constructed shed. Carbon di-sulphide may also be used at the rate of 1 oz. to a 96-lb. barrel or 3 lb. to 1000 cubic feet space. The exposure must not last more than twenty-four hours.—S. E. W.

Potatoes, Genetic Studies in: the inheritance of an abnormal haulm type. By R. R. Salaman and J. W. Lesley (*Jour. Gen. x. pp. 22-36; July 1920*).—A prostrate variety of potato arose among seedlings grown at Barley. The anatomical peculiarities of the prostrate form are described and the genetical constitution is worked out. The variety breeds true to the prostrate habit, and it differs from the normal in at least two and possibly in three factors.—F. J. C.

Primula bellidifolia King. By J. Hutchinson (*Bot. Mag. t. 8801, June 1919*).—A blue purple species of the Capitatae section with coarsely-toothed setulose leaves. Native of Sikkim and Bhutan, whence it was introduced by Messrs. Bees. It is quite hardy but unfortunately monocarpic.—F. J. C.

Primula chionantha Balf. f. et Forrest. By J. Hutchinson (*Bot. Mag. t. 8816; Sept. 1919*).—Collected in Yunnan by Mr. G. Forrest in 1913. A robust farinose species with flowers in verticils or umbels, of a whitish colour, about an inch in diameter. It appears to be monocarpic but produces abundant seed.—F. J. C.

Primula pulvinata Balf. f. et Ward. By J. Hutchinson (*Bot. Mag. t. 8836; March 1920*).—Discovered by F. Kingdon Ward in Yunnan at 11,000 ft. elevation. A small cushion plant with short 2- to 3-flowered peduncles and golden-yellow flowers. Its hardiness is at present in doubt, but it has succeeded in the same conditions as *P. Forrestii*.—F. J. C.

Primula spicata Franch. By J. Hutchinson (*Bot. Mag. t. 8821; Dec. 1919*).—Found by the Abbé Delavay near Tali in W. Yunnan, and introduced by Mr. G. Forrest. It is unfortunately monocarpic, like most of its relatives, though hardy and easy to raise from seed. It is nearly allied to *P. chasmophila*, but differs in the loose arrangement of the flowers, in the leaves, and in the farinose upper part of the peduncle and the calyx.—F. J. C.

Pruning, Young Deciduous Trees. By W. P. Tufts (*U.S.A. Exp. Stn. Calif., Bull. 313, figs.*).—This report deals with the early training of most kinds of fruit-trees in California. Light pruning is advocated, since it is claimed that lightly pruned trees come into bearing from one to three years earlier than heavily pruned ones; that they have stockier and stronger branches, and show greater all-round development. Summer pruning is also discussed, it is said that this form of pruning is weakening, and results in slightly smaller trees, but under certain conditions may hasten profitable production. Tables are given which contain much interesting data.—A. N. R.

Rhododendron dichroanthum Diels. By J. Hutchinson (*Bot. Mag. t. 8815; Sept. 1919*).—Discovered by Mr. G. Forrest in Yunnan. Flowered at Caerhays in May 1918. Nearly related to *D. neriiflorum*, but the lower surface of the leaves is mealy and the stamens puberulous. The corolla is purplish-red in the plate, but creamy or yellowish-rose forms have been found.—F. J. C.

Rhododendron ledoides Balf. f. et W. W. Sm. By J. Hutchinson (*Bot. Mag.* t. 8831).—This rhododendron belongs to the series *Cephalanthum*, and seed was collected by Mr. Forrest in 1913 at an elevation of 13,000 feet on the Tibet-Yunnan border. It flowered with Mr. J. C. Williams in 1917 at Caerhays. The plant reaches 2 feet in height, has the habit of a *Ledum*, and bears heads of small expanded pink flowers with a short tube.—*F. J. C.*

Rhododendron lutescens Franch. By J. Hutchinson (*Bot. Mag.* t. 8851; June 1920).—Leaves scaly, long acuminate, margins reddish, flowers sulphur-yellow; a shrub up to 6 feet in height, introduced by Messrs. Veitch through Mr. Wilson. Hardy, except for late frosts.—*F. J. C.*

Rhododendron oleifolium Franch. By J. Hutchinson (*Bot. Mag.* t. 8802, June 1919).—A native of Tali, Yunnan, where seed was collected by Mr. Forrest. Seedlings flowered when but two years old, the pink flowers being like those of *R. racemosum*, solitary in the axils of the leaves. It is distinguished from *R. racemosum* by the longer, narrower leaves, by the soft hairy covering outside the corolla tube, and by the scaly style. The last two characters are not shown in the figure.—*F. J. C.*

Rhododendron praevernium. By J. Hutchinson (*Gard. Chron.* March 13, 1920, p. 127).—Description with Latin diagnosis of this new species, differing from *R. sutchense* in having a glabrous midrib and large purple blotch in the corolla.
E. A. B.

Rhododendron serotinum Hutchinson (*Bot. Mag.* t. 8841; June 1920).—Introduced through France from China, where the Abbé Delavay collected the seeds. It is related to *R. decorum*, but the growth is straggly, the leaves unequally cordate at the base, the corolla glandular outside and blotched within. It is hardy, and forms a gaunt sparsely branched bush up to 10 feet in height.
F. J. C.

Rhododendron vernicosum Franch. By J. Hutchinson (*Bot. Mag.* t. 8834; March 1920).—Mr. Wilson collected seed of this species for Messrs. Veitch. It is related to *R. Fortunei*, but has smaller leaves unequally rounded at the base and a widely campanulate corolla tube. The flowers are pink and about 1½ to 2 inches in diameter. It makes a shrub up to 15 feet in height.—*F. J. C.*

Ribes Jessoniae Stapf (*Bot. Mag.* t. 8840, March 1920).—Discovered by Wilson in W. Szechwan. A bush up to 9 feet high, with leaves somewhat like those of the red currant and long erect many-flowered racemes of tawny red flowers, followed in the female plant (the species is dioecious) by pale rusty yellow fruits. It is perfectly hardy.—*F. J. C.*

Ribes niveum Lindl. By O. Stapf (*Bot. Mag.* t. 8849; June 1920).—A white-flowered gooseberry introduced by the R.H.S. through Douglas about 1826, perfectly hardy, and, though ornamental, not widely distributed. Fruit dark purple, small. Bush somewhat prickly, and reaching to about 10 feet.
F. J. C.

Rosa glutinosa var. *dalmatica* Borbas. By R. A. Rolfe (*Bot. Mag.* t. 8826; Dec. 1919).—Known in gardens as *R. glutinosa*, but distinct by its longer straight prickles, minutely hairy leaflets, and larger ovoid, not globose, fruits. It is a dwarf species hardly more than 1½ ft. in height, with flowers of the sweet-briar type and hairy scarlet fruits.—*F. J. C.*

Roses for Hybridation. By Cochet-Cochet and S. Mottet (*Le Jard.* vol. xxxiv. pp. 100, 101; 2 figs.).—*Rosa sericea* and *R. Moyesii* are recommended as forming excellent subjects for hybridation.—*S. E. W.*

Rust and Common Barberry. By L. H. Pammel (*Iowa State Hort. Soc. Trans.* 1918, pp. 401-408).—Owing to the serious loss in cereal crops due to rust, the growing of barberry is prohibited in North Dakota. *Berberis vulgaris*, *B. amurensis*, and *B. sinensis* act as hosts to rust spores, but *B. Thunbergii* is immune.—*S. E. W.*

Sabia latifolia Rehd. and Wils. By O. Stapf (*Bot. Mag.* t. 8859, Sept. 1920).—Hardy at Warley against a north wall, and bearing small red flowers in axillary clusters of two to four.—*F. J. C.*

St. John's Wort and Insects. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxx. pp. 470-472; 1 plate).—In certain districts of New South Wales, St. John's Wort (*Hypericum perforatum*) is a pernicious weed and is spreading rapidly. It is hoped that it may be kept in check by a Coccid (*Icerya hyperici*) which feeds on its roots and base of stems. The young female is $\frac{1}{24}$ inch long, of a reddish-yellow colour. The dorsal surface is covered with a woolly secretion interspersed with fine hairs. The adult female is $\frac{1}{8}$ inch in length. It varies in colour from orange yellow to brick red. The black antennæ have ten joints. The legs are black; they are well developed and terminate in curved tarsal claws.—S. E. W.

Salvia brevilabra Franch. By S. A. Skan (*Bot. Mag.* t. 8848; June 1920).—First collected in West Szechuan by Soulié, and later by Wilson, this herbaceous perennial of about 2 feet is hardy, has bullate, coarsely toothed leaves, and flowers with bluish-purple corolla rising from a reddish calyx.—F. J. C.

Satsuma Oranges in Japan. By T. Tanaka (*U.S. Dep. Agr., Bur. Pl. Ind. C.P. and B.I., Circ.* 5, pp. 1-10; 2 figs.).—The following varieties of Satsuma Oranges are cultivated in Japan:—'Zairai,' the primitive variety, bears seedy fruit of an inferior flavour. 'Ikeda' has small round fruit with few seeds. It is a late variety and keeps well. 'Owari,' introduced in 1877, has largely replaced the preceding sorts. It bears large fruit of good quality, is nearly seedless, and ripens early. 'Wase' comes into bearing early, but is of weak growth. The fruit is large, with a conspicuous navel, and is usually seedless. The flavour is only fair and mildly acid. It ripens two weeks earlier than 'Owari.' The fruit of 'Hira' is large, flattened, of mild flavour, and usually seedless. 'Ikiriki' is of vigorous growth. The fruit has a mild flavour and contains few seeds.—S. E. W.

Satsuma Oranges in the United States. By L. B. Scott (*U.S. Dep. Agr., Bur. Pl. Ind. H. and P., Circ.* 1, pp. 3-7).—The 'Owari,' 'Ikeda,' and 'Zairai' varieties of Satsuma Orange are grown in the States. Sufficient care has not been taken to segregate the different varieties in the orchards, and keep them distinct.—S. E. W.

Seeds, The Influence of Physiological Condition of, upon the Course of Subsequent Growth and the Yield: Physiological Predetermination. By Franklin Kidd, M.A., D.Sc., and Cyril West, D.Sc., F.L.S. (*Ann. Appl. Biol.* vol. v. No. 1, July 1918, "The Effects of Soaking Seeds in Water," pp. 1-10, 2 figs.; No. 2, Oct. 1918, Review of Literature, pp. 112-142; Nos. 3 and 4, Review of Literature, pp. 157-170, 3 text figs.).—Consideration of results makes it clear that differences in the resulting plants from seeds differing in degrees of ripeness cannot be satisfactorily predetermined in the cases of single species—due to the fact that records of plants grown from mature and immature seeds are complicated by some period of storage. Immature seeds are less tolerant of storage in dry condition. Total yields from them are generally less than those from ripened seed owing to the fact that a smaller percentage of the latter fail to germinate. Experiments for comparison of yield per plant show that the advantage in favour of the matured seed tends to disappear or to be reversed, but as a general practice the use of immature seed is not to be recommended owing to its poor storage qualities. The conclusions drawn from a review of literature prove that the effects of parental conditions upon the seed are considerable; the environment of the parent plant and the position of the seed on the parent plant are factors which play important parts, though the problem is complicated by hereditary factors.

Soaking the seed in distilled water before sowing may have a marked effect on the subsequent plant-growth, but a germination test cannot be trusted to give a standard by which to judge the effect, and quite different results are obtained by treating closely allied plants by the same methods.—R. C. S. R.

Septoria, Biological Specialization in the Genus. By W. S. Beach (*Amer. Jour. Bot.* vol. vi. No. 1, Jan. 1919, pp. 1-33; 2 plates, 13 figs.).—The author finds that certain species of *Septoria* are differentiated into biological forms, which in general are limited to one or to a few closely related hosts which they can vigorously infect. Certain species of *Septoria* vary considerably in morphological characters under different environmental conditions. Inoculation experiments show that *Septoria malvicola* E. & M. and *S. Fairmani* E. & E. are identical, and similar experiments show that the form *S. Convolvuli* Desm., parasitic on *Convolvulus arvensis*, is biologically as well as morphologically distinct from the type form of *S. Convolvuli* described upon *C. Sepium*, and that it is a new species.—A. B.

Sigmatostalix costaricensis Rolfe (*Bot. Mag.* t. 8825; Dec. 1919).—A species from the Andes flowered at Kew in October 1915, producing a spike of small green, red, and yellow flowers, and thriving with the *Oncidiums*.—F. J. C.

Sinapis Juncea var. **napiformis**. By R. de Noter (*Le Jard.* vol. xxxiv. pp. 157, 158; 1 fig.).—The tuberous Chinese Mustard (*Sinapis napiformis*) provides a useful culinary root resembling a turnip in shape. It can be raised from seed.—S. E. W.

Snapdragon Rust. By Geo. L. Peltier (*U.S.A. Agr. Exp. Stn. Ill., Bull.* 221, Aug. 1919, pp. 534–548).—The rust of the snapdragon (*Puccinia Antirrhini* D. & H.) has been known since 1879 in California, but it is only in recent years that it has made an appearance in Illinois. The disease attacks plants in all stages of growth, and becomes evident on leaves, pods, and stems, both outdoor and under-glass plants being affected. The fungus appears to be limited to the snapdragon (*Antirrhinum majus* Linn.) and its varieties, all of which are equally susceptible. Bordeaux and other spraying fluids are not effective in controlling the disease. The best control measures are attention to cultural methods, the destruction of all affected plants, and avoidance of excessive moisture.—A. B.

Snow Flies. By W. W. Froggatt (*Agr. Gaz. N.S.W.* vol. xxix. pp. 434–436; 1 plate).—The Snow Flies (*Aleurodidae*) are related to the scale insects and to the plant lice. The plump body and the two pairs of rounded wings are covered with white mealy dust. Infested foliage appears to be covered with spots. A new species, *Aleurodes albofloccosa*, is 4 mm. in length; the white hair, like filaments springing from the margin of the test, measure from $\frac{1}{4}$ inch to $\frac{1}{2}$ inch in length.—S. E. W.

Soil Solubilities, Rate and Extent of. By Geo. J. Bouyoucos (*U.S.A. Exp. Stn. Mich., Tech. Bull.* No. 44, June 1919, pp. 1–50).—The study of the rate and solubility of soils is obviously of great importance from both a practical and scientific standpoint. The questions of the velocity and amount of soil passing into solution, the application of the mass law, the solubility law, the difference in rate and extent of solubility under various treatments and state of fertility are of fundamental importance. The author in the investigation of the problems made use of a new method—the freezing-point method. The soils were washed to remove all the free-soluble salts until they had a freezing-point depression very close to that of distilled water. The rate and extent of soil solubility at various moisture contents were measured at different temperatures: (1) below freezing; (2) 20°C. (room temperature); (3) 53°C. Seven different soils were employed in this study: one clay, two clay loams, two silt loams, one sandy loam, one sand. When different soils were treated with $\text{N}/10 \text{ Ca}(\text{NO}_3)_2$, NaNO_3 , KNO_3 , KCl , K_2SO_4 , $(\text{NH}_4)_2\text{SO}_4$, MgSO_4 , KH_2PO_4 , $\text{CaH}_4(\text{PO}_4)_2$, and $\text{Na}_2\text{C}_2\text{H}_3\text{O}_2$, and then washed until all their free-soluble salts were eliminated and their water-content consisted of 1 of soil to .7 of water it was found that at room temperature the rate of solubility was slow and gradual; and this continued for 50 to 120 days, except in the case of $(\text{NH}_4)_2\text{SO}_4$, where the rate was very rapid at the beginning, but it soon slowed down. The extent of solubility or the amount of material which dissolved was appreciable. The concentration of the soil solution depends upon the relative masses of the soil and water. The amount of material that goes into solution seems to increase as the ratio of soil to water is increased up to about the optimum moisture content, and then it decreases.—A. B.

Soil, The Destruction of Vanillin by Soil Bacteria in the. By William J. Robbins and A. E. Elizando (*U.S.A. Exp. Stn. Alabama, Bull.* 204, June 1918, pp. 124–132).—The author in a previous paper has shown that the absence of toxic effects of a toxic organic compound added to soil depends upon the presence and action of suitable micro-organisms which destroy the toxic compound. In this paper it is shown that vanillin (an aldehyde which is harmful in water culture at a concentration of one part per million to wheat plants) is rapidly destroyed by the action of bacteria. These bacteria have no bad effect upon the growth of plants.—A. B.

Soil, The Nitrification of Pyridine, Quinoline, Guanidine Carbonate, &c., in. By M. J. Funchess (*U.S.A. Exp. Stn. Alabama, Bull.* 196, June 1917, pp. 65–82).—The following summary is given of the conclusions arrived at:

Quinoline is nitrified most readily in soil with highest lime requirement. Lime retarded or inhibited the nitrification of quinoline; it also inhibits nitri-

fication of guanidine carbonate, but it helps the nitrification of dried blood, piperidine, nucleic acid, alloxan, and asparagine. Liming a soil which has been partially sterilized with carbon bisulphide greatly increases its power of nitrification. Vanillin is non-toxic toward nitrification of piperidine, moderately toxic toward nitrification of dried blood and pyridine, and inhibitory towards nitrification of quinoline. The toxicity of vanillin is counteracted largely by lime. Pyrogallol retards nitrification of all compounds, except quinoline and piperidine. Salicylic aldehyde completely inhibits nitrification of all compounds except piperidine.

A short bibliography is appended.—A. B.

Soils, Acid, The Development of Soluble Manganese in. By M. J. Funchess (*U.S.A. Agr. Exp. Stn. Alabama, Bull.* 201, June 1918, pp. 37-78; 12 plates).—Acid soils from this experimental station are injured by addition of dried blood as a fertilizer, and this infertility is attributed to the formation of soluble manganese in the soil solution. The manganese is believed to be due to the action of nitric acid formed during nitrification when dried blood is used as a source of nitrogen. When ammonium sulphate is the source of nitrogen, nitrification is apparently unnecessary in order to increase the amount of soluble manganese in acid soils. The reduced growth is due to the direct action of manganese, and this acts upon the roots and to a certain extent upon the foliage. Water extracts of such soils are highly toxic to seedling plants. If, however, the manganese is precipitated into an insoluble form, the water extracts support a vigorous plant-growth. Precipitation by calcium, sodium, and potassium hydroxides are very effective in this connexion. The products of sulphofication are also effective in dissolving manganese in acid soils. Manganese salts applied to basic soils would be rapidly changed, the manganese passing out of solution. When applied to acid soils, the manganese salts persist as such, and heavy application would cause injury.

A short bibliography is appended.—A. B.

Soils, The Cause of the Disappearance of Cumarin, Vanillin, Pyridine, and Quinoline in. By William J. Robbins (*U.S.A. Exp. Stn. Alabama, Bull.* 195, June 1917, pp. 48-64; 2 plates).—The much-debated question as to the toxicity of substances to plants when grown in soils containing such, was investigated in this present paper. Previous investigators have found that such toxic substances are decidedly harmful to plant growth if present in soils, while others hold that some such compounds, if present, soon disappear, and therefore have no toxic action upon plants. The chemicals used in this work were vanillin, cumarin, pyridine, and quinoline, and these were added separately to soils at a concentration of 1 000 parts a million of air-dry soil. The first effect was to increase enormously the number of bacteria; the number of Actinomyces colonies in soils treated with cumarin, vanillin, and quinoline, however, decreases. Steam sterilization of the soil produces material toxic to the growth of wheat plants. Soil micro-organisms destroy the toxicity of the steamed soil. The effect on the growth of wheat, of vanillin, cumarin, pyridine, and quinoline in sterile soil, and in soils which have been sterilized, reinoculated, and incubated, were compared. It was found that the toxic effect persists in the sterile soil, but largely disappears in the reinoculated soils. Specific bacteria were isolated from the soils which utilize cumarin, vanillin, and pyridine as food sources. The bacterium feeding upon vanillin will in pure cultures destroy the toxicity of vanillin to wheat, and the bacterium feeding on cumarin under similar conditions will destroy the toxicity of cumarin to wheat. The conclusion drawn is that the chief cause of the disappearance of the toxicity of cumarin, vanillin, pyridine, and quinoline in inoculated soils is due to the fact that they serve as food to definite species of bacteria.

A short bibliography is appended.—A. B.

Sorospora uvela, a Fungus Parasite of Noctuid Larvae, Further Studies on. By A. T. Speare (*Jour. Agr. Res.* xviii. pp. 399-439, Jan. 1920; 6 plates).—This entomogenous fungus is recorded and described for the first time in the States.

An historical summary is given of this group of fungi, followed by a life-history and methods of cultivation on favourable media. The disease is easily transmitted to healthy insects, and under laboratory conditions a mortality of 60 to 90 per cent. was obtained.

Two full-page sketches and six microphotographs complete the paper.
G. F. W.

Spray, Combined. By G. A. Meir (*Agr. Gaz. N.S.W.* vol. xxx. p. 624).—Codling moth, Woolly Aphis and Scale are destroyed in one operation by the following spray: soft soap, 8 lb.; tobacco extract, $\frac{1}{4}$ pint; lead arsenate, 4 lb.; water, 80 gallons.—S. E. W.

Spray Gun. By W. J. Allen (*Agr. Gaz. N.S.W.* vol. xxx. pp. 893-894). Comparative tests have proved that ordinary spraying is more effectual and cheaper than spraying with the gun.—S. E. W.

Spray Gun versus Rod and Dust in Apple Orchard Pest Control. By L. Childs (*U.S.A. Exp. Stn. Oregon, Bull.* 171, July 1920, pp. 5-46; 17 figs.).—The results of four years' experiments, 1916-1919, in dusting are described and tabulated. Scab and codling moth have been controlled by dusting—spray rods and guns giving almost identical results. $3\frac{1}{2}$ to 4 h.p. sprayers can only efficiently operate one gun at a pressure of 250 lb. Costs have been worked out of the difference between $3\frac{1}{2}$ and 10 h.p. machines, and it was found that with the lesser horse power the work could be done slightly cheaper, but not so economically or efficiently as with the higher horse-power machine.—G. F. W.

Sprays Mixed. By A. A. Ramsay (*Agr. Gaz. N.S.W.* vol. xxx. pp. 428, 429; 1 fig.).—Emulsified oils cannot as a rule be mixed with other spraying materials. Ferrous sulphate and sulphuric acid must be used alone. The following mixtures are permissible:

Liver of sulphur with soap, washing soda.

Ammonia copper carbonate with tobacco extract.

Bordeaux mixture with lead arsenate, Paris green, tobacco extract.

Burgundy mixture with tobacco extract.

Iron sulphide with Bordeaux, lime-sulphur.

Lead arsenate with Bordeaux, lime-sulphur, atomic sulphur, tobacco extract.

Lime-sulphur with iron sulphide, lead arsenate, tobacco extract.

Paris green with Bordeaux, tobacco extract.

Resin wash with kerosine emulsion, tobacco extract.

Soap with alkali sulphides, Bordeaux, tobacco, resin wash, washing soda.

Sulphur (atomic) with lead arsenate, Paris green.

Tobacco extracts with ammonia copper carbonate, Bordeaux, Burgundy, lead arsenate, lime-sulphur, oil emulsions, resin wash, soap, washing soda.

Washing soda with alkali sulphides, emulsified oils, soap, tobacco extract.
S. E. W.

Stanhopea costaricensis Reichb. f. By R. A. Rolfe (*Bot. Mag.* t. 8830; March 1920).—A species collected by Mr. C. H. Lankester in Costa Rica and flowered at Kew has been identified tentatively with Reichenbach's *Stanhopea costaricensis*. The flowers are large with buff-yellow sepals, marked with light-red somewhat ring-like spots, and with smaller spots on the petals and lip. The lip possesses a curious sac and there are two dark-red "eye" spots on the lip.—F. J. C.

Steam Sterilization. By E. G. Beinhart (*U.S. Dep. Agr., Farmers' Bull.* 996, pp. 1-15; 4 figs.).—In raising Tobacco plants from seed, it is a great advantage to sterilize the seed-beds as a protection from fungoid diseases. This is best accomplished by the steam-pan process. The steam-pan is an inverted shallow wooden box, 4 inches in depth, wide enough to fit in the sides of the frame of the seed-bed, e.g. 12 ft. by 6 ft. It is connected by a hose with a 20-h.p. boiler, and the pressure in the boiler must be maintained at 100 lb. After thirty minutes, the steam is shut off and the pan moved along the bed to the next area. The steamed area is covered with a blanket to conserve the heat. The seed-bed before steaming must be well worked, the fertilizers mixed in the soil, and the whole comparatively dry. The seeds may be sown twelve hours after the steaming.—S. E. W.

Stomata, Influence of Light upon the Action of. By J. Gray and Geo. J. Peirce (*Amer. Jour. Bot.* vol. vi. No. 4, April 1919, pp. 131-154; 18 figs.).—The study of the stomatal reactions of various cultivated and wild species by the authors have led to the following conclusions:

(1) The stomata of barley, wheat, oats, and rye plants open with light and close with darkness. (2) Increase or decrease in the amount of light, when it has reached a minimum intensity, will have a corresponding effect upon the width of the stomatal openings. (3) The opening and closing being accomplished by the changes in shape of the guard cells of the stomata, a minimum amount

of moisture in the soil is required by each species in order to produce and maintain the turgidity of the guard cells, without which changes in their shape are impossible. (4) The moisture, soil, and light requirements of the different species are essentially alike, though not identical.

A short bibliography is appended.—A. B.

Storage of Food Products. By C. J. Brand (*U.S. Dep. Agr., Bull.* 729, pp. 1-10).—Uniformity of temperature and ventilation are the chief desiderata in a storage warehouse for food-products. Apples require a temperature of 31°-32° F., and a relative humidity of 85-90 per cent. For potatoes a temperature between 35° and 40° F. is required, with humidity 80-90 per cent. Daylight must be excluded. The potatoes must not be stored on the earth floor but in bins with slat sides and bottoms. Onions are stored in shallow, slatted bins at 32°-36° F. Cabbages require a temperature of 32°-35° F., with 80-90 per cent. of humidity. Sweet potatoes are first kept at 85° F., with thorough ventilation. After one to three weeks, the temperature is allowed to fall gradually to 50°-55° F. A dry atmosphere is essential.—S. E. W.

Stranvaesia salicifolia Hutchinson (*Bot. Mag.* t. 8862, Sept. 1920).—Differing from *S. undulata* in its narrower leaves, quickly deciduous stipules and bracts, and red (not orange) fruits. At Kew it becomes a taller, less compact plant than *S. undulata* and is quite hardy.—F. J. C.

Strawberry Cultivation. By J. Blanchouin (*Le Jard.* vol. xxxiv. pp. 62, 63).—Various methods are used for keeping the strawberry crop clean. Perhaps the most satisfactory is to apply a top dressing of long stable manure in February. The rain washes the straw clean before the fruit appears. Another good plan is to lay down wheat-straw before the berries form. On no account should grass cuttings, moss, or sawdust be used, and spent tan is not advisable, as it injures the plants if it is dug in after the crop has been gathered.—S. E. W.

Strawberry, Sterility of. By W. D. Valleau (*Jour. Agr. Res.* xii. pp. 613-669; March 1918).—The author finds that, though the number of stamens in the flower of the strawberry is variable, decrease in the number is in no way related to diœciousness. There is, however, a positive relation between the flower position, number of its parts, and the size of its fruits. The wild American species which are largely concerned in the cultivated ones are mostly diœcious. Fertility is found to decrease in the later flowers of an inflorescence, especially in hermaphrodite forms. No evidence of physiological self-sterility was found. The degree of development of the stamens is followed. Plates show the different degrees to which development is carried in certain races of the strawberry.—F. J. C.

Strawberry Tortrix, Oxygrapha comariana Z., **The Life-History of the.** By F. R. Petherbridge (*Ann. App. Biol.* vol. vii. no. 1, Sept. 1920, pp. 6-10; 1 plate, 3 figs.).—Records the life-history of a microlepidopterous insect that occasionally causes serious loss to strawberry-growers. The damage is easily recognized, as the caterpillars bind the leaflets or several leaves together by means of threads. Two broods occur in a year, the winter being passed in the egg state.

Natural enemies include a new species of chalcid, *Compidosoma tortricis* (q.v.), which destroys large numbers of the larvæ.

The best means of reducing the pest is to cut off the foliage as close to the crown as possible in early September, when the pest is in the second pupal stage, and burn it.—G. F. W.

Symphyandra asiatica Nakai. By W. B. Turrill (*Bot. Mag.* t. 8837; March 1920).—A Korean plant, of which seed was collected by Mr. E. H. Wilson, nearly related to *S. cretica*. It attains a height of 2½ feet and produces a lax branched inflorescence of five heliotrope flowers as large as those of *Campanula Trachelium*. Its hardiness has not been tested.—F. J. C.

Thornerottia longifolia N. E. Brown. By S. A. Skan (*Bot. Mag.* t. 8824; Dec. 1919).—A plant for the succulent house, not remarkable for beauty.—F. J. C.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 13, 1920.

Mr. C. G. A. NIX in the Chair.

One hundred and eighty-six Fellows and three Associates were elected, and twelve Societies affiliated.

GENERAL MEETING.

JANUARY 27, 1920.

The Right Hon. Lord LAMBOURNE in the Chair.

Eighty-one Fellows and four Associates were elected, and five Societies affiliated.

ANNUAL GENERAL MEETING.

FEBRUARY 10, 1920.

The Right Hon. Lord LAMBOURNE in the Chair.

One hundred and seventeen Fellows and two Associates were elected, and nine Societies affiliated.

The Minutes of the last Annual Meeting were read and signed.

The Chairman, having spoken on the subject of the Annual Report (see below), moved its adoption. This was seconded by the Treasurer, who explained the position of the Society's finances. The Accounts were adopted.

The following names of President, Vice-Presidents, members of the Council and officers having been duly proposed and seconded and the list sent round in accordance with By-law 74, and no other names having been proposed, the following were declared elected by the Chairman :

<i>As President.</i>	<i>Proposed by</i>	<i>Seconded by</i>
The Rt. Hon. The Lord Lambourne, P.C., C.V.O.	Mr. W. A. Bilney, J.P.	Lt.-Col. F. R. S. Balfour, M.A.
<i>As Treasurer.</i>		
Mr. C. G. A. Nix.	Mr. F. J. Hanbury.	Mr. J. Hudson, V.M.H.
<i>As Secretary.</i>	<div> <div>The Rt. Hon. Lord Lambourne, P.C., C.V.O.</div> <div>Sir Harry J. Veitch, V.M.H.</div> </div>	<div> <div>Mr. H. B. May, V.M.H.</div> <div>The Rev. W. Wilks, M.A., V.M.H.</div> </div>
Mr. W. R. Dykes, M.A., L.-ès-L.		

As Members of Council.

The Rt. Hon. Lord Balfour
of Burleigh, K.T., G.C.M.G.
Mr. W. Cuthbertson, V.M.H.
Mr. James Hudson, V.M.H.
Sir Albert K. Rollit, D.C.L.,
LL.D.
Rev. W. Wilks, M.A.,
V.M.H.

Proposed by

The Rt. Hon. Lord Lam-
bourne, P.C., C.V.O.
The Rt. Hon. Lord Lam-
bourne, P.C., C.V.O.
Sir Harry J. Veitch,
V.M.H.
Mr. W. A. Bilney, J.P.
The Rt. Hon. Lord Lam-
bourne, P.C., C.V.O.

Seconded by

Lt.-Col. F. R. S.
Balfour, M.A.
Mr. Henry B. May,
V.M.H.
Mr. W. A. Bilney, J.P.
Mr. J. Hudson, V.M.H.
Sir Harry J. Veitch,
V.M.H.

As Vice-Presidents.

The Duke of Bedford, K.G.,
F.R.S.
The Rt. Hon. The Earl of
Ducie, F.R.S.
Sir John T. Dillwyn-
Llewelyn, Bt., D.L., J.P.,
V.M.H.
The Duke of Portland,
K.G., P.C., G.C.V.O.
The Rt. Hon. James W.
Lowther, P.C.
The Rt. Hon. Lord Gren-
fell, F.M.
Sir James Knott, Bt.
Sir Daniel Morris, K.C.M.G.,
V.M.H.
Sir David Prain, C.M.G.,
F.R.S., V.M.H.
Sir Harry J. Veitch, V.M.H.

The Rt. Hon. Lord Lam-
bourne, P.C., C.V.O. Mr. C. G. A. Nix.

As Auditor.

Mr. Alfred C. Harper.

Mr. C. G. A. Nix.

Mr. E. A. Bowles,
M.A., V.M.H.

Fellows present spoke on various subjects relative to the work of the Society, Mr. Elwes particularly urging that the standard of the JOURNAL should be raised to one approaching the old Transactions of the Society.

Mr. Oakes expressed the hope that there would be no avoidable delay in the publication of Pritzel, and that more money should be spent on the library.

Mr. A. K. Bulley made the suggestion that an attempt should be made to naturalize on mountain-sides as many hardy plants as possible. The experiments should be made both on calcareous and on non-calcareous formations.

The Secretary replied to the various questions raised.

V.M.H. Medals were handed to Mr. McHattie, Mr. E. White, and Mr. S. T. Wright.

The Lawrence Medal was handed to Mr. J. A. Nix.

On behalf of the Veitch Memorial Trustees, Sir Harry Veitch handed the Veitch Memorial Medal to the Rev. W. Wilks, V.M.H., and Mr. W. Crump, V.M.H.

Lord Lambourne, who in his speech had spoken with great feeling concerning the resignations of the late President, Field-Marshal Lord Grenfell, Sir Harry Veitch, and the Secretary, the Rev. W. Wilks, introduced the new Secretary, Mr. W. R. Dykes, to the Fellows present.

The Meeting closed with a vote of thanks to the President for occupying the Chair.

REPORT OF THE COUNCIL FOR THE YEAR 1919.

1. **The Year 1919.**—The year 1919 is chiefly memorable for the receiving back of our own Hall after its occupation by the War Office for the Australian Imperial Force during the years of war. The President and Council have patiently borne with the inconveniences attaching to the use of the London Scottish Drill Hall, and are now able to rejoice whole-heartedly in having their own building restored to them again.

2. **R.H.S. Hall.**—The Hall and premises will require very considerable renovation and repair after their long occupation by the military, but the Council intend, for various practical reasons, to defer this until the August holidays, omitting one fortnightly meeting (August 10) for that purpose. The Standing Committees will meet on August 10 on the first floor for committee work only. There will be no Meeting in the Hall itself. Diaries announcing this Meeting should be corrected.

3. **The President's Chair.**—It was with no little regret that the Council heard in the early spring that the President, Field Marshal Lord Grenfell, G.C.B., G.C.M.G., wished to lay down the reins of office. Appointed President in February 1913, through all the troubled years of war, Lord Grenfell's military and other influence has been of inestimable value to the Council in directing the affairs of the Society. The Society owes a great debt of gratitude to Lord Grenfell for all he did for it at a period when he was already overburdened with pressing military duties. It was, moreover, no mere ornamental sinecure, but a great office that he was called to fill after it had been held for so long a term of years by the late Sir Trevor Lawrence. The Council, as a mark of their appreciation, have caused a new medal to be struck in his honour, which will be known as the "Grenfell Medal," and will be awarded at, and after, the first meeting in January to exhibits of all kinds, and will rank in value between the Flora and the Banksian Medals.

4. **The New President.**—The Council had not one moment's hesitation in asking the Rt. Hon. The Lord Lambourne, P.C., C.V.O., Lord Lieutenant of Essex, to accept the Presidency. Lord Lambourne has been long and widely known in Parliamentary circles, and is himself no mean horticulturist. For some few years he has been a Member of the Council, and from his very regular attendance has come to be familiar with all its affairs. His universal popularity, and his well-known devotion to all public duties, added to his position as a horticulturist, make him an ideal President of whom the Fellows of the Society may be justly proud.

5. **Resignations and New Appointments.**—A resignation which every horticulturist throughout the world will regret very deeply is that of Sir Harry J. Veitch, Kt., V.M.H. Sir Harry was appointed to the Council in February 1888, and worked most energetically with Sir Daniel Morris, K.C.M.G., and Mr. Wilks at the first reconstruction of the Society at that most critical time; but the pressure of his own vast business necessitated his resignation in the following year. He rejoined the Council in 1897, and has ever since been one of its most regular and useful members. He most kindly took over the burden of the Treasurer's office during the absence of Mr. Charles Nix on war duties. Again Sir Harry feels compelled to withdraw, not now from the stress of business, but from increasing years. The Fellows may be assured that the President and Council have used every possible argument to retain so experienced a member, and one so universally respected and beloved, upon their body, but they feel that it would not be a fair reward for all Sir Harry has done for the Society in the past to urge him further in the present. They have, however, asked Sir Harry to allow them to nominate him as one of the Vice-Presidents.

Another noticeable event is the resignation of the Rev. W. Wilks, who has been Secretary of the Society since the Annual Meeting in February 1888, and the nomination of Mr. W. R. Dykes, M.A. Oxon., L.-ès-L. Paris, as his successor. Mr. Dykes has for several years been one of the masters at the

Charterhouse School. He is the author of a magnificent monograph on the genus *Iris*, and is a thoroughly practical gardener. He is at present investigating the family of Tulips. The Council believe that in Mr. Dykes the Fellows will find a very able successor to Mr. Wilks, who will efficiently carry on the work of the Society under the direction of the Council. The Council are glad to say that they will still continue to have the assistance of Mr. Wilks, who has consented to be nominated for one of the vacancies on the Council.

Another resignation which the Council had to accept with regret was that of Dr. Frederick Keeble, F.R.S., C.B.E., Director of Wisley Gardens. Soon after the commencement of the war the Council released Dr. Keeble for war-work in order that he might take up the Directorship of Horticulture in the Food Production Department of the Government. Discovering the utility of having a distinctly horticultural section of the Board of Agriculture, and, as a post-war development, the Government formed a separate department for horticulture, and appointed Dr. Keeble Secretary. He has also been appointed Sherardian Professor of Botany in the University of Oxford. His successor as Director of Wisley is Mr. Frederick J. Chittenden, F.L.S., V.M.H., who has, for many years, been working for the Society in the Scientific and Experimental Department at Wisley, and also as Editor of the JOURNAL and Secretary of the Scientific Committee. The Council feel themselves happy in being able to retain the services of Dr. Keeble on the Wisley and other Committees.

6. Conjoint Board of Scientific Societies.—Captain Arthur Hill, M.A., a Member of the Council, has been appointed to represent the Society on the Conjoint Board of Scientific Societies in the place of Dr. Keeble, F.R.S., resigned. This Society is doing a very useful work in the direction of co-ordinating the energies of the various Scientific Societies of this country.

7. War Relief Fund.—Substantial progress has been made with the Society's War Relief Fund. The total amount received exceeds £40,000 made up of contributions from all parts of the Empire. The Fund is being managed by a special Committee, the Presidents being Lord Lambourne and Lady Northcote, C.I., the Council being represented by Mr. F. J. Hanbury, who acts as Chairman, Sir Harry J. Veitch, Treasurer, and Sir Albert K. Rollit, who is Consul-General for Roumania.

Considerable supplies of seeds and garden requisites have already been sent to Belgium and Roumania, whilst 33,000 packages of onion and cabbage seeds suitable for autumn sowing were recently distributed in the devastated districts of France. Arrangements are now being made for the distribution of large quantities of fruit trees, seeds, and tools during the present winter and spring, the Committee being in communication with the Relief Committees of the Allied countries.

8. The R.H.S. Food Production Campaign.—The Society's war-work on Food Production was closed on March 31, at the instance of H.M. Government, who considered that a further Grant in aid of it was no longer needed. The enormous labour which the Food Production Campaign involved will never be forgotten by those officers of the Society whom it more directly concerned; but one of the most pleasant features of the war years, which assisted and encouraged the work, was the hearty spirit of co-operation which was shown to the Society in all parts of the country, and found its concrete expression in the Society's Panel of Honorary Expert Garden Advisers, upon which over 2,000 names were enrolled. It was with no little pleasure that the Council recognized the work done by members of the Panel by bestowing upon each of them a Diploma worded as follows:—

"Diploma of Voluntary Service in Food Production.

*To.....
for patriotic assistance rendered during the Great European War, 1914-1919, as a Member of the Society's Panel of Garden Advisers."*

This Diploma was welcomed by the Panel Members to a far greater degree than had been anticipated by the Council, and the letters acknowledging it have been filed and placed in the Library as very pleasing historical documents in the annals of the Society.

9. Chelsea Show.—It was with some hesitation that the Council entered the Chelsea Show in its programme for the year. The decision having to be

made so soon after the signing of the Armistice, it was far from certain in those early days what success it would be likely to meet with, and how far possibilities of tenting and labour, and indeed, of exhibits also, would permit of the Show being held. But never in the experience of any Member of the Council can a Meeting be remembered which left behind it such a sense of solid success. Not only was the tenting to be had, but exhibitors responded magnificently with exhibits. The weather was perfect, the attendance was large, and the Show paid its way. The new Scientific Section proved to be such a source of un-failing interest that the special tent devoted to Education was filled from morning until night with Fellows and others studiously examining the several exhibits with a manifest and encouraging interest. The lectures, also, were excellent and were very well attended.

10. Extra Fruit Meetings.—The Council have arranged to devote considerable space to Fruit exhibits on March 9 and August 24, 1920. In March specimens of late-keeping Apples and Pears are invited, and on August 24, Plums and early varieties of Apples and Pears. They have invited the Canadian and South African Governments to exhibit any fruits in season on these two dates. The Council would also welcome a display of Australian, Tasmanian, and New Zealand fruits in their season.

A new Division (Division VI.) has been added to the great Autumn Fruit Meeting on October 5, in order to encourage the smaller amateur growers to exhibit. The rules will be found in the "Book of Arrangements" under date October 5, page 61.

11. Cardiff Show.—It is nearly thirty-five years since an attempt was made by the Society to hold a Meeting in the Provinces. The last effort at Liverpool was so great a financial loss that the Council have always feared to reintroduce a Provincial Meeting, so that the Society's educational exhibition work has been confined to London as a centre combined with the sending of deputations to provincial societies. Responding, however, to an invitation from the Lord Mayor of Cardiff, repeated by the Cardiff and County Horticultural Society, it has been decided to hold a great Meeting in that city on July 6, 7, and 8. Fellows' tickets will, of course, admit. It is hoped that exhibitors—amateur and trade—will rally round the old Society on this occasion so as to make the Meeting a success in every sense of the word, and one worthy of the Society's reputation. With such co-operation it cannot fail to be an influence for good in manifold directions.

12. The London Children's Gardens.—The London Children's Gardens were again inspected by two members of the Council, Mr. Bilney, J.P., and Mr. Hudson, V.M.H., and a most satisfactory and encouraging Report has been issued.

13. Examinations.—The Society has held the following examinations this year, viz.: The National Diploma Examinations; The General Examinations in Horticulture (Seniors and Juniors); The Teachers' Examinations in School and Cottage Gardening (Preliminary and Honours); and The Examination of Student-Teachers for the Glamorgan County Council. The arrangements under the new Board of Examiners, established in 1918, have worked well, and the Examinations have been considerably advanced in the standard of the practical knowledge they require.

14. Pritzel.—The typing on cards of all the references in the original Pritzel and also in the Kew Supplement was finished in May, the total number of cards being about 200,000. Several voluminous works which had purposely been excluded from the Kew Supplement (*e.g.*, Engler and Prantl's *Pflanzenfamilien*, and the *Pflanzenreich*) have also been gone through for the inclusion of the figures contained in them, with the result that many thousand more references have been added. Concurrently with this work the cards have been sorted according to the periodicals or books to which they refer: this was finished in September.

In order to make the new Index as complete as possible, the Kew library has been systematically searched for omissions in the original Index and casual oversights of a later date, about 700 titles of books or periodicals being noted down for inclusion. As many of these titles cover several volumes, the number

of additional references to the Index will be enormous, far greater, indeed, than was originally anticipated.

It was also found necessary to collate the list comprising all the original and additional publications so far extracted, or ear-marked for extraction, with the catalogue of the Natural History section of the British Museum, so that gaps in the Kew Library might be discovered and filled. This very laborious work has also been brought to its conclusion.

In August 385 circulars were dispatched to public institutions at home and abroad as well as to private botanists and horticulturists, inviting their sympathy and assistance in the endeavour to make the Index as complete as possible. It was suggested to them that on application they could receive a copy of the complete list of the works to be included in the New Index, in order that they might check it with their own annotations, and for the last three months the Pritzel staff has been engaged in getting this list into shape and stencilling it for distribution. The fact that many references in the original work have been found very difficult to trace, owing to imperfect or cryptic abbreviations, or because the titles quoted were those of papers published in periodicals, has complicated and retarded this part of the work very much. It is now, however, practically finished, and 100 copies of the List of Titles, which runs to about 4,000 entries, will very soon be ready for dispatch. As the titles would have had to be checked and standardized in any case, the progress of the work cannot be considered to have been impeded by this operation, except in so far as the stencilling is concerned.

Having sorted the cards according to publications, their chronological or numerical sorting within each publication, preparatory to the final checking, became necessary. About a quarter of the cards have already been dealt with in this way. The checking itself has also been taken in hand. Among the works checked are some which, owing to the erratic way of the publication of their parts, have proved very troublesome and will require a final collation with the copies in the British Museum.

The remaining task lies in the extraction of the additions, the conclusion of the chronological sorting, and the final checking of the cards, which latter promises to be the most extensive part of the whole work.

Up to the present time £1,200 has been subscribed, £900 of which has already been spent in the preparation of the manuscript. The further printing and publication of the completed volume or volumes will require little less than another £2,500, so that it need hardly be added that more funds for the purpose are urgently needed if we are even to hope to begin printing next year.

15. Deputations.—A deputation from the Society, consisting of the President, the Rt. Hon. Lord Lambourne, C.V.O., Mr. F. J. Chittenden, F.L.S., V.M.H., Mr. James Hudson, V.M.H., Mr. H. B. May, V.M.H., and the Rev. W. Wilks, M.A., V.M.H., visited the Birmingham Show on July 18. It was a magnificent exhibition and a memorable occasion, if only from the point of view that it was the first deputation from the Society after the war.

An invitation from the York Gala has been accepted for a Deputation to visit the York Show on June 16, 17, and 18, 1920. Similar invitations have been received from Walsall and from Cannock, but these the Council have felt obliged to decline.

16. Sugar for Preserving.—On March 4 a deputation waited upon Lord Bledisloe on the subject of the provision of sugar to private growers of fruit for jam-making. They were most kindly and sympathetically received, and, as a result of the representations made, the position was considerably eased, and a sufficiency of sugar was forthcoming for jam-making during the season.

17. Hampton Court Gardens.—The Society was asked to nominate a representative to act on Sir Aston Webb's Special Committee appointed to consider the restoration of the Hampton Court Gardens to their pre-war condition. Lieut.-Col. F. R. S. Balfour, M.A., a Member of Council, was nominated accordingly. It was a matter of general satisfaction that the Committee's report justified the demands of the garden-loving public in desiring this restoration.

18. Wisley.—The past year has seen the gradual return of members of the Wisley staff from the war, and with it the resumption of some of those activities which have been almost in abeyance during a great part of the war period. The new Laboratory is not yet fully staffed, owing mainly to the natural hesitation of the Council to pledge the future financial position of the Society. The filling of the various vacancies on the staff has been a matter of the greatest

concern to the Council and the Garden Committee, who are most anxious to see this department in full working order; but they are also equally desirous of making no further advances than the existing income of the Society warrants, in order that when new posts are filled, or new appointments made, there may be no compulsory withdrawal. The recent great advance in the standard of wages and in the cost of goods of all kinds has naturally led to a great increase in the cost of the Garden beyond the pre-war standard, and has rendered more necessary than ever an adequate endowment of Wisley so that the work carried on there, important and valuable as it already is, may not be hampered by lack of funds. It is hoped not only that those whose business depends upon the growing of plants will furnish the funds necessary for the endowment of temporary or permanent research scholarships, so that matters of importance to the various horticultural industries may be thoroughly investigated, but that a permanent endowment fund sufficient to render the work at Wisley independent of all fluctuations in the Society's annual income may be built up without delay.

19. Additional Land.—An exceptional opportunity, which the Council seized, occurred during the year of securing a sufficient area of land for the development of the experimental work at Wisley. It was evident that more land would be required in the immediate future for experiment in such pressing matters as substitutes for the rapidly diminishing supplies of stable manure, and also for the extension of the fruit-experiment work. The land purchased adjoins the Garden, being separated from it only by a road. Most of it is at present let to farmers, but as the leases fall in it can be used to extend the Society's work.

20. Trials and Garden Work.—The floral trials, which have been in abeyance during the war, will be at once resumed. The vegetable trials have latterly been largely increased and have attracted much attention. The trials of lettuces, dwarf beans, early potatoes, and parsley have been very extensive, the lettuce trials especially serving to draw attention to some valuable forms hitherto neglected in most British gardens. Full reports will appear in the *JOURNAL*. The extensive collection of Irises has been arranged according to the classification adopted by the Floral Committee in the last trial, and planted as a border on the hill-side. • Progress is also being made with the development of the shrub and tree planting of Seven Acres Field, and with the planting of the Pinetum. A trial of washes against Rose mildew was carried out during the year. The exhibition of apples and pears set up in the Laboratory has attracted a considerable amount of attention from visitors.

21. Forrest Expedition.—Mr. George Forrest's plant and seed collecting expedition into Western China, in which the Society co-operates, has produced a quantity of seeds far greater than was ever expected even from this well-known collector. Very large numbers of plants have been raised and are growing on from the seeds collected in 1917 and 1918. Some of these have already been distributed among the Fellows, and others will be available in 1920 and the following years. The collections are particularly rich in shrubs and in Primulas; but many of the latter are far from "easy" plants to grow, others, on the contrary, are very amenable to cultivation. Mr. Forrest's expedition terminates in January, and the finds of 1919 have still to reach us.

22. Experimental Work.—The return of Lieut. A. N. Rawes from Germany after the Armistice enabled considerable progress to be made with the orchard-pollination experiments which have been in progress for some time, and it is hoped to publish a further report upon certain aspects of them shortly. Experiments on the summer pruning of apples are being continued; Dr. Darbishire is continuing his research upon the comparative composition of different varieties of potatoes &c.; Captain Page, who took up his duties as head of the Chemistry Department in June, has commenced experimental work upon the important question of green-manuring; Mr. G. F. Wilson has obtained some promising results in his experiments upon the onion fly, which will be continued; experiments designed to ascertain the causes of the different yield-capacity of potatoes are being continued; the crosses of Rubi made three or four years ago have given no very satisfactory results, partly on account of their developing a certain amount of tenderness on the one hand and of partial sterility on the other; but several of the results of crosses made by Dr. J. Wilson of St. Andrews University are being grown on, as also are Dr. Keeble's seedling vines.

23. **Silver-Leaf Disease.**—Mr. J. Bintner has carried out at Wisley a number of inoculation experiments with silver-leaf disease during the year, and the Council appointed a Committee to consider what steps could be taken to battle with this pest. Much has been accomplished by various workers in this country, and arrangements are being made to publish a summary of what is known in the Society's JOURNAL.

24. **School of Horticulture.**—The number of young men now attending the second year's course of training at Wisley has reached its pre-war level and negotiations have been opened at the instance of the Board of Education for the training of teachers in gardening. The number of students to be trained is limited by the lack of housing accommodation, and a Hostel for students is one of the *most urgently needed* requirements of the Society.

25. **Training of Disabled Men.**—Arrangements have been completed for giving twenty men disabled in the war a year's training in market-gardening and fruit-growing, in connection with the Government land settlement scheme. They will be lodged in huts to be erected in the Gardens by the authorities concerned.

26. **Gifts.**—A scholarship, tenable at the Society's Gardens for two years, has been most kindly founded by Sir James Knott, Bt. Its value is £30 a year, and it will be given biennially to men not exceeding twenty-two years of age who have secured a first class in the Society's General Examination in Horticulture. The founding of scholarships at the Society's Garden is one of the most useful ways in which friends of the Society, and of Horticulture, can help forward its educational work and the general progress of the gardening profession. To many promising young men the addition of a scholarship of this value is sufficient to make possible a thorough grounding in the rudiments of horticulture which would otherwise be beyond their reach. The Council are most grateful to Sir James Knott for this gift, and hope it may prove provocative of imitation, particularly in the direction of the establishment of Scholarships in Practical Research.

The Society is greatly indebted to Sir Francis Burdett, Bt., for a magnificent Silver Challenge Cup which the Council propose to award to the best exhibit of *Gladiolus* made during the year. (See "Arrangements," p. 58.)

The Council acknowledge with many thanks a valuable engraving of Sir Joseph Hooker in the midst of Himalayan surroundings, kindly presented by Mr. Gerald W. E. Loder.

The Council have also to thank Messrs. Bunyard, of Maidstone, for a Silver Cup to be awarded to the best newly raised Apple. (See "Arrangements," p. 62.)

The conditions attaching to these and other Cups will be found in the "Book of Arrangements" for 1920.

A number of books, plants, and seeds have been presented to Wisley during the year, and our thanks are due to the kind donors. Special mention should be made of a handsome legacy from the late Lady Macleay, which included a beautifully bound complete set of the *Botanical Magazine*; and of the gift of a large number of books, herbarium specimens, and excellent botanical lantern-slides, from the Rev. Professor George Henslow, V.M.H. Mr. James Hudson, V.M.H., has offered a prize of £5 to Wisley Students in 1920 and 1921. Money gifts to the Laboratory have also been received from B. Buxton, Esq., and J. Buchanan, Esq. The family of the late Mrs. K. Spurrell has presented that lady's collection of Daffodils. These will be planted together and known as the "Katherine Spurrell collection."

27. **Dr. Rendle and the Society's Meetings.**—The Society is advancing with the general advance of the world in this time of after-war reconstruction, and among other developments the Council have an earnest desire to give greater importance and emphasis to the lectures delivered at the Society's fortnightly meetings. Now that the Meetings are again held in our own Hall at Vincent Square, and the lecture room is again available, it is hoped that Fellows will attend the lectures more regularly and in greater numbers. An interesting feature introduced into the calendar for 1920 is the delivery of conversational lectures by the Society's recently appointed Botanical Professor, Dr. A. B. Rendle, F.R.S., F.L.S., V.M.H., who will draw the attention of the Fellows present to any special points of interest in the plants and flowers to be found

in the Meeting of the day. This is a revival of an old custom with which those who can remember the Society's Meetings in the old days in the Great Hall at South Kensington will be familiar, when, punctually at 3 o'clock, the President and Council filed up on to the platform with the Lecturer for the day and a most interesting Meeting was held. The lecture then consisted either of an address on some particular horticultural subject or of a running comment by the Society's Botanist, Professor Henslow or Sir William Thiselton-Dyer, on some of the specimens exhibited, pointing out their peculiarities, merits and requirements, and other interesting points connected or associated with them. Fellows will find a return to this old custom not only a pleasant change but also a most instructive one. They should also note that on the occasions of the lectures, if they have any point of difficulty they would like to bring up, or information they would like to give or to gain, if they would mention such matters at or after the discussion following the lecture and just before the close of the Meeting, they will be dealt with as far as possible at the time, or reserved for further report.

28. Afternoon Teas.—The Council have arranged for teas to be served at 1s. a head in Committee Room No. 1 on the first floor on all Meeting Days from the Annual Meeting in February to the Chrysanthemum Meeting in November, both inclusive. It is hoped that Fellows will make use of this effort of the Council to provide for their convenience.

29. Library.—The Library has been kept up to date, but the year has been marked by a peculiar dearth of new Horticultural books and of good old ones coming on to the market. The additions, therefore, have of necessity been somewhat scanty. Amongst the new books are: "De Vries' Works," Smith's "British Lichens," Farrer's "English Rock Garden," Cook's "Applied Economic Botany," the Duke of Bedford's "Science and Fruit Growing," "The Catalogue of the Massachusetts Horticultural Library," &c., &c. Amongst the periodicals kept up are: *The Journal of Botany*, *The Journal of Heredity*, *Annals of Botany*, *Botanical Gazette*, *The New Phytologist*, *Journal of Genetics*, *Botanical Magazine* (two copies), *Revue Horticole*, *Bonnier's Flora*, and *Annales des Sciences Naturelles*—*Botanique*, &c., &c.

30. Garden Charts.—The Council wish to call the attention of Fellows to the Charts which they have prepared for the use of lecturers, teachers, schools, &c. The first series is now completed, but they have decided not to proceed with the second series until the first has been disposed of. The Charts are excellently well prepared, and, so far as is known, are superior to anything hitherto produced of a like nature. Great care and much time and thought have been given to their preparation, and a complete set should be in the hands of every educational body throughout the country. It will be found that the cost will represent money well spent. Every horticultural society and allotment society should possess a set to hang in their Meeting Room for the reference and instruction of their members. Returnable specimen copies will be sent on application to the Secretary.

31. Smoking in the Hall.—The Council have been frequently approached by Fellows complaining of the increasing practice of smoking in the Hall. And they have as frequently ordered notices to be put up requesting gentlemen to refrain from smoking, which has never been allowed during the Society's Meetings.

The Council earnestly hope that no further occasion may be given for this complaint.

32. Obituary.—Each year the Council have to record the loss through death of some who have been the closest friends of the Society for a long number of years past. During the past year Sir Frank Crisp, Bt., V.M.H., whose gardens at Friars Park, Henley, were so famous throughout the country, if not throughout the world, was taken from us; Mr. George Bunyard, V.M.H., who has been one of the great pioneers of fruit-growing, and for many years a devoted Member of the Council, and Mr. Thomas Smith, V.M.H., of Newry, also passed away. Amongst others—Sir Thomas Dyke Acland, Bt., M. Maurice de Vilmorin, M. Philippe de Vilmorin, F. du Cane Godman, Sir Walpole Greenwell, Bt., Viscountess Halifax, Lady Macleay, Miss F. S. Musgrave, E. Rochford, Lord Ravensworth, Lady Tate, Sir C. E. Tritton, the Countess of Bessborough, Herr

Van Waveren, Jesse Willard, T. W. Turner, Archdeacon Sinclair, Herr Van Tubergen, William Goldring, and R. H. Curtis who was always so kind in preparing our Wisley Weather Chart records.

33. **V.M.H.**—It is always a great regret to the Council to hear of the death of any holders of the Victoria Medal of Honour, though at the same time it affords them the opportunity of honouring others. To fill the vacancies caused by the above-mentioned deaths they have appointed Mr. J. W. McHattie, Superintendent of the Edinburgh Parks and Gardens; Mr. Edward White, the well-known British Landscape Gardener, and Honorary Secretary of the International Horticultural Exhibition 1912; and Mr. S. T. Wright, who for the past twenty-three years has been Superintendent of the Society's Gardens and Shows.

34. **Lawrence Medal.**—The Lawrence Medal for the year has been awarded to Mr. John A. Nix for two superb Educational Exhibits of Fruits showing how much can be done without heated glass-houses.

35. **Numerical Position.**—The following table shows the Society's position with regard to numerical strength during the past year:

LOSS BY DEATH IN 1919.					
			£	s.	d.
Life Fellows.....	12	.....	0	0	0
4 Guineas.....	4	.....	16	16	0
2 „	101	.....	212	2	0
1 „	122	.....	128	2	0
	239		£357	0	0

LOSS BY RESIGNATION, &c.					
			£	s.	d.
4 Guineas.....	1	.....	4	4	0
2 „	92	.....	193	4	0
1 „	132	.....	138	12	0
	225		£336	0	0
TOTAL LOSS	464		£693	0	0

FELLOWS ELECTED IN 1919.					
			£	s.	d.
4 Guineas	19	...	79	16	0
2 „	680	...	1,428	0	0
1 „	898	...	942	18	0
Associates	64	...	33	12	0
Affiliated Societies	78	...	81	18	0
Commutations	31				
			= £659	9s.	0d.
	1770		£2,566	4	0
Loss.....			693	0	0
NET INCREASE IN INCOME	£1,873		4	0	
New Fellows.....			1,770		
Deaths and Resignations			464		
NUMERICAL INCREASE.....			1,306		
Total on December 31, 1918*			12,914		
Total on December 31, 1919			14,220		

36. **Committees, etc.**—Again the thanks of the Council are extended to the members of the various Committees of the Society and to the Board of Examiners for the valuable work they have done. The Council take this opportunity of thanking the Committees for the patience with which they have borne the inconveniences unavoidably attached to their Meetings in the Drill Hall, and hope that these inconveniences will only linger in their memory sufficiently to make them value the more the comfortable conditions afforded in the Society's own premises.

The Council wish to thank most cordially the Territorial Force Association for lessening the difficulties of the Society's situation by placing the London Scottish Drill Hall at the Society's service during the war, and also to thank Captain Scott and his staff for the kindly consideration and assistance so willingly and so often extended.

And, lastly, the Council desire to thank the various members of their own staff for the work they have so loyally done during the year, and the Press

* In the Report for 1918 this figure was given as 14,632. This included 1718 Fellows who had during the War ceased to subscribe but who had not formally resigned. The names of all such lapsed Fellows have now been removed and the figures brought into exact correspondence with the facts.—W. W.

for their unfailing assistance in reporting and giving prominence to the work of the Society.

By Order of the Council,
W. WILKS,
Secretary.

ROYAL HORTICULTURAL SOCIETY,
VINCENT SQUARE, WESTMINSTER, S.W.
January 1, 1920.

Postscriptum.—The Conference on Saxifrages which had been decided upon before the outbreak of the war and which had on that account to be postponed will now be revived and will be held in May 1922. This early notice is given in order that ample time may be afforded for preparation to be made. The co-operation of Amateurs and Nurserymen is cordially invited.

W. W.

Dr.

ANNUAL REVENUE & EXPENDITURE ACCOUNT

	£	s.	d.	£	s.	d.
TO ESTABLISHMENT EXPENSES—						
Ground Rent	690	0	0			
Rates and Taxes	574	13	11			
Water Rate	13	4	0			
Electric Light	9	2	0			
Gas	31	18	11			
				1,318	18	10
Salaries and Wages	3,027	2	4			
Printing and Stationery	1,549	17	0			
Publications	703	12	6			
Postages	536	6	7			
Fuel	60	6	0			
Professional Fees	255	2	2			
Gratuities	81	0	0			
Repairs and Renewals (including £150 for Hall Painting)	349	17	0			
Miscellaneous Expenses	372	15	11			
				6,935	19	6
„ INSURANCES				184	2	5
„ JOURNAL, PRINTING AND POSTAGE				2,980	13	4
„ STAFF PENSION	185	16	8			
Less contributed by the Staff, as per scheme	115	3	4			
				70	13	4
„ MEETINGS—						
Spring Meeting	2,188	10	0			
Autumn Fruit and Vegetable Meeting	273	8	6			
Labour, Floral Meetings and Conferences	194	7	6			
Expenses, do. do.	145	2	7			
Council, Committee and Deputation Expenses	308	17	3			
Painting Orchid Certificates	30	9	0			
				3,140	14	10
„ INSPECTION OF GARDENS				212	17	5
„ PRIZES and MEDALS—						
Awarded at Society's Meetings				465	9	5
„ CONTRIBUTION TO LINDLEY LIBRARY—						
Purchase of Books	42	1	0			
Expenses	51	0	6			
				93	1	6
„ SPECIAL EXPENDITURE—						
Contribution to Forrest Account	250	0	0			
Circular. L. Gentry	212	15	1			
				462	15	1
„ EXAMINATIONS IN HORTICULTURE	325	0	9			
Less Received in Fees	242	18	3			
				82	2	6
„ DEPRECIATION—						
Hall Glass Roof, Furniture, and Appliances for Meetings				380	19	3
„ FOOD PRODUCTION				543	14	2
„ BALANCE, carried to BALANCE SHEET				9,415	7	6
				426,287	9	1

FOR YEAR ENDING 31st DECEMBER 1919.

Cr.

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS				19,117	2	6
„ ENTRANCE FEES				402	3	0
„ DIVIDENDS AND INTEREST	2,242	6	4			
„ do. do. DAVIS TRUST	52	10	7			
				2,294	16	11
„ MEETINGS—						
Spring Meeting	2,128	10	1			
Takings at Hall Meetings	108	10	0			
				2,237	0	1
„ JOURNALS AND OTHER PUBLICATIONS—						
Advertisements	334	4	0			
Sale of Publications	1,332	11	8			
				1,666	15	8
„ PRIZES AND MEDALS				136	2	6
„ LIFE COMPOSITIONS—						
Being amount paid by Fellows now deceased.				84	0	0
„ RENT OF COTTAGES, WISLEY				120	9	5
„ INSPECTION OF GARDENS				228	19	0

£26,287 9 1

Dr.

VINCENT SQUARE—BALANCE

LIABILITIES.

To CAPITAL FUNDS ACCOUNT—			£	s.	d.	£	s.	d.
As at 31st December 1918			46,651	15	2			
Less Fees paid by Fellows now deceased			84	0	0			
						46,567	15	2
„ LIFE COMPOSITIONS, 1919						659	9	0
„ SUNDRY CREDITORS						647	1	8
„ SUBSCRIPTIONS, &c., paid in advance						871	2	0
„ WISLEY SCHOLARSHIPS—								
Balance 31st December 1918						5	4	2
„ RESERVE ACCOUNT—HALL PAINTING—								
Balance 31st December 1918			1,123	13	4			
Added 1919			150	0	0			
						1,273	13	4
„ DEPRECIATION AND RENEWALS RESERVE ACCOUNT—								
Balance 31st December 1918			3,264	10	0			
Added 1919			380	19	3			
						3,645	9	3
„ LABORATORY PRIZE FUND—								
Balance 31st December 1918			17	3	0			
Dividends (Nicholson Memorial Fund)			3	14	4			
						20	17	4
„ WILLIAMS MEMORIAL FUND			48	8	4			
„ MASTERS MEMORIAL FUND			88	4	4			
„ SCHRÖDER PENSION			6	6	8			
„ LINDLEY LIBRARY TRUST			10	0	0			
„ PRITZEL REVISION FUND			341	16	8			
						494	16	0
„ GENERAL REVENUE ACCOUNT			52,899	5	1			
Less CAPITAL EXPENDITURE,								
Wisley			£540	4	6			
„ Bad Debts			1	6	2			
„ WISLEY GARDENS' EN-								
DOWMENT FUND			3,972	7	11			
						4,513	18	7
						48,385	6	6
„ REVENUE FOR THE YEAR 1919,								
as per annexed Account			£9,415	7	6			
Less WISLEY, Excess of Ex-								
penditure over Income			6,787	9	7			
						2,627	17	11
						51,013	4	5
						£105,198	12	4

Dr. WISLEY GARDENS—ANNUAL REVENUE & EXPENDITURE

	£	s.	d.	£	s.	d.	£	s.	d.
To SALARIES—									
Wisley Gardens and Research Station				2,789	9	7			
Do. Bonuses				462	12	0			
							3,252	1	7
„ RATES AND TAXES				121	13	5			
„ WATER RATE				45	2	0			
„ INSURANCES				72	14	2			
„ LABOUR				2,198	16	8			
„ GARDEN IMPLEMENTS				51	8	11			
„ LOAM AND MANURE				73	2	10			
„ REPAIRS				363	12	0			
„ FUEL				491	0	8			
„ MISCELLANEOUS EXPENSES—									
Garden				292	0	5			
Laboratory				12	4	9			
							304	5	2
„ CARTAGE				95	12	6			
							3,817	8	4
„ COST OF GROWING, PACKING AND DISTRIBUTION OF PLANTS TO FELLOWS							465	16	0
„ STAFF PENSION				222	13	3			
Less contributed by the Staff, as per scheme				78	7	6			
							144	5	9
„ DEPRECIATION—									
Glass Houses, Plant and Materials							554	17	6
							<u>£8,234</u>	<u>9</u>	<u>2</u>

ACCOUNT FOR YEAR ENDING 31st DECEMBER 1919.

Cr.

	£	s.	d.	£	s.	d.
By DIVIDENDS AND INTEREST				1,045	1	7
„ PRODUCE SOLD				234	18	0
„ STUDENTS' FEES				136	10	0
„ DONATIONS				30	10	0
„ BALANCE, being excess of Expenditure over Revenue				6,787	9	7

£8,234 9 2

Dr.

WISLEY GARDENS—BALANCE

LIABILITIES.

	£	s.	d.	£	s.	d.
To CAPITAL FUNDS ACCOUNT—						
As at 31st December, 1918	32,932	13	6			
Add Amount transferred to R.H. Society, 31st December, 1919	540	4	6			
				33,472	18	0
„ ENDOWMENT TRUST FUND				28,972	7	11
„ DEPRECIATION AND RENEWALS—						
As at 31st December, 1918	4,191	11	9			
Added, 1919	390	3	6			
				4,581	15	3

£67 027 1 2

ASSETS.

By DWELLING HOUSES—			£	s.	d.	£	s.	d.
As at 31st December 1918			5,651	17	4			
„ GLASS HOUSES, RANGES, POTTING SHED, &c.—								
As at 31st December 1918			5,202	6	0			
„ LABORATORY—								
As at 31st December 1918			20,623	18	2			
						31,478	1	6
N.B.—The Wisley Estates are, under the Trust Deed, vested in the Society only so long as it is in the position to use them as an Experimental Garden. The value of the expenditure thereon depends therefore on the continual use of the Garden by the Society.								
„ STOCK FUEL						250	0	0
„ MOTOR DEPOSIT						150	0	0
„ INVENTORY OF PLANT AND LOOSE EFFECTS—								
As taken by Mr. Chittenden						1,324	7	6
„ LIBRARY						270	9	0
„ INVESTMENT OF DEPRECIATION AND RENEWALS RESERVE ACCOUNT—								
£2,981 11s. 10d. 3½% India Stock cost			£2,772	7	0			
£705 15s. 3d. 2½% Consols cost			415	8	10			
£650 5% War Loan cost			607	17	0			
						3,795	12	10
Add Cash for Investment, 1919						786	2	5
						4,581	15	3
„ ENDOWMENT TRUST FUND INVESTMENTS—								
Great Eastern Railway Company 4% Debenture Stock £3,500			3,535	0	0			
Leopoldina Railway Company, Ltd. 5% Terminable Debentures £2,000			2,000	0	0			
City of Moscow Loan 1912. 4½% Bonds £6,000			5,730	0	0			
Buenos Ayres Great Southern Railway Company 5% Non-Cumulative Preference Stock £2,500			2,825	0	0			
War Stock 4½% 1925-45, £5,000			5,000	0	0			
War Stock 5% 1929-47, 4350			3,972	7	11			
Canadian Pacific Railway Company 4% Perpetual Consolidated Debenture Stock £4,632			3,890	17	6			
Consols 2½% £3,229 5s. 6d.			1,889	2	6			
London County Consolidated 3½% Stock £135 8s. 4d.			130	0	0			
						28,972	7	11

(In common with most pre-war Securities, the above have, for sale purposes, considerably depreciated, but for revenue purposes they bring in the same income as before, less Interest on the City of Moscow Loan, upon which no dividend has been received during the year.)

£67,027 1 2

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position on the 31st Dec. 1919.

ALFRED C. HARPER, F.C.A., Auditor,
(HARPER BROTHERS & FEATHER, Chartered Accountants),
35 Great Tower Street, London, E.C.

13th January 1920.

Dr.

ALFRED DAVIS

Bequeathed to the Society in 1870 for Annual Prizes,

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December 1918	1,797	8	9			
„ Dividends received 1919				52	10	7

WILLIAMS

Raised by Donations in 1891 in Memory of

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December 1918	204	2	5			
„ Balance 31st December 1918				38	0	1
„ Dividends received 1919				10	8	3
				48	8	4

MASTERS

Raised by Donations in 1908 in Memory of Dr. Masters

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December 1918	542	17	0			
„ Balance 31st December 1918				68	4	4
„ Dividends received 1919				20	0	0
				88	4	4

NICHOLSON

Raised by Donations in 1908 in Memory of

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December 1918	160	12	11			
„ Dividends received 1919				6	9	10

SCHRÖDER

Provided by Royal Horticultural Society in Memory of the late Baron

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December 1918	557	14	6			
„ Balance 31st December 1918				6	11	8
„ Dividends received 1919				19	15	0
				26	6	8

TRUST FUND.

Cr.

or in any other way the Council may determine.

	£	s.	d.	£	s.	d.
By Consols, £2,022 8s. 9d. cost	1,797	8	9			
„ Revenue and Expenditure Account				52	10	7

MEMORIAL FUND.

B. S. Williams towards Prizes and Medals.

	£	s.	d.	£	s.	d.
By East India Railway Co. Annuity, Class B £7	168	0	0			
„ New South Wales Government 4 per cent. Inscribed Stock (1942-62) £36 3s. 1d.	36	2	5			
	204	2	5			
„ Balance in hands of R.H. Society				48	8	4
				48	8	4

MEMORIAL FUND.

towards the Provision of one or more Annual Lectures.

	£	s.	d.	£	s.	d.
By Midland Railway Consolidated 2½ per cent. Perpetual Preference Stock £400	290	13	6			
„ Midland Railway Consolidated 2½ per cent. Perpetual Guaranteed Preferential Stock £400	252	3	6			
	542	17	0			
„ Balance in hands of R.H. Society				88	4	4
				88	4	4

MEMORIAL FUND.

George Nicholson for Prizes to Wisley Students.

	£	s.	d.	£	s.	d.
By Tasmanian Government 4 per cent. Inscribed Stock (1940-50), £162 4s. 5d.	160	12	11			
„ Cost of Prizes				2	15	6
„ Transfer to Wisley Prize Fund				3	14	4
				6	9	10

PENSION.

Schröder to pay to Gardeners' Royal Benevolent Institution for one Pension.

	£	s.	d.	£	s.	d.
By Great Western Railway 4 per cent. Debenture Stock £500.	557	14	6			
„ Gardeners' Royal Benevolent Institution				20	0	0
„ Balance in hands of R.H. Society				6	6	8
				26	6	8

Dr.

LINDLEY LIBRARY

	£	s.	d.	£	s.	d.
To Amount of Fund 31st December 1918	6,268	2	3			
„ Contribution from R.H. Society, 31st December 1919		42	1	0		

	<u>6,310</u>	<u>3</u>	<u>3</u>			
To Balance 31st December 1918				10	0	0
„ Dividends and Donations received 1919				48	19	6
„ Contribution from R.H. Society, 31st December 1919				51	0	6
				<u>110</u>	<u>0</u>	<u>0</u>

PRITZEL REVISION

Fund to be raised for the Revision of Pritzel's Iconum

	£	s.	d.	£	s.	d.
To Amount of Fund, 31st December 1918	<u>859</u>	<u>2</u>	<u>2</u>			
„ Balance, 31st December 1918				6	14	1
„ Dividends received, 1919				34	2	8
„ Donations				1,277	7	3
				<u>1,318</u>	<u>4</u>	<u>0</u>

TRUST.

Cr.

	£	s.	d.	£	s.	d.
By Lancashire and Yorkshire Railway 3 per cent. Consolidated Preference Stock £1,516 held by the Charity Commissioners	1,458	15	7			
„ Value of Library, 31st December 1918	4,809	6	8			
„ Purchase of Books, 1919 (<i>See</i> Report)	42	1	0			
	<u>6,310</u>	<u>3</u>	<u>3</u>			
By Librarian's salary				100	0	0
„ Balance in hands of R.H. Society				10	0	0
				<u>110</u>	<u>0</u>	<u>0</u>

FUND.

Botanicarum Index. Estimated cost, £3,000.

	£	s.	d.	£	s.	d.
By India 2½ per cent. Stock £1,367 13 6	<u>859</u>	<u>2</u>	<u>2</u>			
„ Repayment of Loan to R.H. Society				375	0	0
„ Amount expended, 1919				601	7	4
„ Balance in hands of R.H. Society				341	16	8
				<u>1,318</u>	<u>4</u>	<u>0</u>

SCHEDULE OF INVESTMENTS.

31st December 1919.

			<i>£</i>	<i>s.</i>	<i>d.</i>
2½ %	Consols	£5,324 19s. 8d.	<i>cost</i>	5,081	6 0
3 %	Local Loans	£5,800	„	6,006	16 6
3½ %	Dominion of Canada Registered Stock (1930-1950),				
	£2,000		„	2,000	0 0
3½ %	London County Consolidated Stock	£2,864 11s. 8d.	„	2,884	6 10
3½ %	India Stock	£2,063 4s.	„	2,024	10 4
5 %	Havana Terminal Railroad Company Mortgage				
	Debenture Bonds	£8,300	„	8,946	0 0
4½ %	Central Argentine Railway, Limited, Consolidated				
	Preference Stock	£2,800	„	2,907	3 6
4 %	Central Argentine Railway, Limited, Debenture				
	Stock	£600	„	537	15 10
2½ %	India Stock	£186 9s.	„	109	2 2
4 %	Mortgage on Freehold	£1,000	„	1,000	0 0
5 %	War Loan,	£9,550	„	9,274	18 2
3½ %	War Loan,	£5,700	„	4,977	2 3
				<u>£45,749</u>	<u>1 7</u>

GENERAL MEETING.

FEBRUARY 24, 1920.

Mr. J. CHEAL in the Chair.

One hundred and thirty Fellows and thirteen Associates were elected, and eleven Societies affiliated.

A lecture on "The Cultivation of Fruits under Glass with a Minimum of Fire Heat" was given by Mr. James Hudson, V.M.H.

GENERAL MEETING.

MARCH 9, 1920.

Mr. J. CHEAL in the Chair.

One hundred and fourteen Fellows and fourteen Associates were elected, and four Societies affiliated.

A lecture on "Fruits which can be grown under Glass without Fire Heat" was given by Mr. James Hudson, V.M.H.

GENERAL MEETING.

MARCH 23, 1920.

Rev. W. WILKS, M.A., V.M.H., in the Chair.

One hundred and twenty-one Fellows and three Associates were elected, and seven Societies affiliated.

A lecture entitled "Wandering down Old Garden By-roads" was given by the Rev. J. Jacob.

GENERAL MEETING.

APRIL 13, 1920.

Mr. W. R. DYKES, M.A., in the Chair.

One hundred and thirty-nine Fellows and nine Associates were elected, and eight Societies affiliated.

A lecture on "Plants of Interest at the Meeting" was given by Dr. A. B. Rendle, F.R.S., V.M.H.

The Daffodil Meeting took place on this day, the classes being according to the published schedule. The Barr Silver Daffodil Vase was won by W. B. Cranfield, Esq.

GENERAL MEETING.

APRIL 27, 1920.

Mr. E. A. BOWLES, M.A., in the Chair.

One hundred and twelve Fellows and one Associate were elected, and three Societies affiliated.

A lecture on "Magnolias" was given by Mr. P. C. M. Veitch (see p. 315).

GENERAL MEETING.

MAY 11, 1920.

Sir ALBERT K. ROLLIT, LL.D., in the Chair.

One hundred and twenty-four Fellows and four Associates were elected, and three Societies affiliated.

A lecture on "The Use and Relative Values of Trees in Great Britain" was given by Sir Daniel Morris, K.C.M.G., V.M.H.

SPRING MEETING AT CHELSEA.

JUNE 1, 2, 3, 1920.

List of Awards.

ORCHIDS.

Gold Williams Medal.

To Messrs. Charlesworth & Co., for Orchids.

Gold Medal.

To Sir Jeremiah Colman, Bt. (gr. J. Collier), for Orchids.

To Messrs. Armstrong & Brown, for Orchids.

To Messrs. J. & A. McBean, for Orchids.

Silver-gilt Flora Medal.

To Messrs. Cypher & Sons, for Orchids.

To Messrs. Flory & Black, for Orchids.

Silver-gilt Grenfell Medal.

To Messrs. Stuart Low & Co., for Orchids.

To Messrs. Mansell & Hatcher, for Orchids.

Silver Flora Medal.

To Mr. H. Dixon, for Orchids.

EXHIBITS IN THE OPEN AIR.

Gold Medal.

To Messrs. J. Piper & Son, for formal garden.

To Messrs. Tucker & Son, for formal garden.

To Messrs. Wallace & Co., for rock garden.

Silver-gilt Flora Medal.

To Messrs. Whitelegg & Co., for rock garden.

To Messrs. J. Klinkert, for clipped trees, &c.

To Messrs. Waterer, Sons & Crisp, for ornamental trees, shrubs, and topiary work.

Silver-gilt Grenfell Medal.

To Messrs. Herbert Jones, for Italian garden.

To Mr. Clarence Elliott, for rock garden.

To Messrs. J. Macdonald, for exhibit of Grasses.

To Messrs. J. Piper & Son, for topiary and Japanese trees.

Silver-gilt Banksian Medal.

To Mr. E. Dixon, for formal garden.

To Messrs. Pulham & Son, for formal garden.

To Mr. T. R. Hayes, for rock garden.

To Messrs. Pulham & Son, for rock garden.

To Messrs. Fromow & Sons, for Japanese Maples.

To Mr. L. R. Russell, flowering and ornamental shrubs.

Silver Flora Medal.

To Messrs. Herbert Jones, for formal garden.

Sherwood Memorial Cup for the Best Exhibit in the Show.

To Messrs. Waterer, Sons & Crisp, for Rhododendrons.

"Daily Graphic" Cup, for the best Rock Garden.

To Messrs. R. Wallace & Co.

EXHIBITS IN THE TENTS.

Gold Flora Medal.

To Messrs. Allwood Bros., for Carnations.

Gold Medal.

To Messrs. Blackmore & Langdon, for Begonias, Gloxinias, &c.
 To Messrs. J. Carter & Co., for flowering plants.
 To Messrs. Dobbie & Co., for Sweet Peas.
 To the Donard Nursery Co., for new and rare shrubs.
 To Mr. Amos Perry, for ferns and herbaceous plants.
 To Messrs. Rivers & Son, for fruit trees in pots.
 To Messrs. Sutton & Sons, for Calceolarias and flowering plants.
 To Messrs. Wallace & Co., for Lilies, Iris, Eremuri, &c.
 To the Hon. C. V. O. Ward (gr. Charles Beckett), for collection of fruit.
 To Messrs. Waterer, Sons & Crisp, for Rhododendrons.

Silver-gilt Flora Medal.

To Messrs. A. Dickson & Sons, for Sweet Peas.
 To Messrs. Dobbie & Co., for Antirrhinums.
 To Messrs. Paul & Son, for Roses.
 To Messrs. Wm. Paul & Son, Ltd., for Roses.
 To Messrs. Webb & Sons, for flowering plants.

Silver-gilt Grenfell Medal.

To Messrs. Artindale & Son, for Eremuri.
 To Messrs. Barr & Sons, for herbaceous plants.
 To Messrs. R. H. Bath, Ltd., for herbaceous, Pæonies, &c.
 To Messrs. Bees, Ltd., for herbaceous and alpine.
 To A. P. Brandt, Esq. (gr. J. W. Barks), for Crotons.
 To Messrs. Ben R. Cant & Sons, for Roses.
 To Mr. J. Douglas, for Border Carnations.
 To Mr. Clarence Elliott, for alpine.
 To Messrs. C. Engelmann, for Carnations.
 To Mr. Elisha J. Hicks, for Roses.
 To Messrs. G. Jackman & Sons, for herbaceous plants.
 To Mr. T. Lewis, for Rhododendrons.
 To Messrs. Stuart Low & Co., for Carnations.
 To Messrs. J. Peed & Son, for Caladiums.
 To Mr. G. Reuthe, for herbaceous plants.
 To Mr. L. R. Russell, for stove and flowering plants.
 To Messrs. Waterer, Sons & Crisp, for alpine and herbaceous plants.

Silver-gilt Banksian Medal.

To Mr. J. C. Allgrove, for herbaceous and alpine plants.
 To Mr. R. Bolton, for Sweet Peas.
 To A. P. Brandt, Esq. (gr. J. W. Barks), for Pelargoniums.
 To Messrs. Cheal & Sons, for flowering trees and shrubs.
 To Messrs. Cheal & Sons, for herbaceous plants, &c.
 To Messrs. Cutbush & Son, for Roses.
 To Messrs. Cutbush & Son, for topiary trees.
 To Messrs. G. Gibson & Co., for herbaceous plants.
 To Messrs. Kelway & Sons, for Delphiniums.
 To Messrs. Laxton Bros., for Strawberries.
 To Messrs. J. Piper & Son, for Clematis and ornamental shrubs.
 To Mr. Maurice Prichard, for alpine and herbaceous plants.
 To Mr. R. Prichard, for alpine plants.
 To Messrs. W. H. Rogers & Son, for alpine plants.
 To Messrs. R. Tucker & Sons, for herbaceous plants.
 To the Government of Victoria (Australia), for Apples.

Silver-gilt Knightian Medal.

To Messrs. G. Bunyard & Co., for Apples.

Silver Lindley Medal.

To Dr. J. Macwatt, for Primulas.

Silver Flora Medal.

- To Messrs. G. Bunyard & Co., for Irises.
- To Mr. A. Dawkins, for Schizanthus.
- To Mr. G. R. Downer, for Lupines and Delphiniums.
- To Messrs. Fletcher Bros., for Rhododendrons.
- To the Hon. Vicary Gibbs (gr. E. Beckett), for Pelargoniums.
- To Messrs. Godfrey & Son, for Pelargoniums, Poppies, &c.
- To Messrs. B. Ladhams, for herbaceous plants.
- To Messrs. K. Luxford & Co., for Carnations.
- To Messrs. H. B. May & Sons, for ferns and flowering plants.
- To Mr. G. W. Miller, for herbaceous and rock plants.
- To Mr. J. Stevenson, for Sweet Peas.
- To Messrs. Sutton & Sons, for Antirrhinums.
- To Mr. Charles Turner, for Roses.
- To Mr. W. Wells, jun., for hardy plants.

Silver Grenfell Medal.

- To Messrs. Bakers, Ltd., for herbaceous plants.
- To Messrs. Barr & Sons, for Irises.
- To Messrs. Bide & Sons, for Sweet Peas.
- To Messrs. R. & G. Cuthbert, for Azaleas.
- To Messrs. Cutbush & Son, for Carnations.
- To Mr. H. J. Damerum, for Sweet Peas.
- To Messrs. Harkness & Sons, for Lupines.
- To Mr. C. H. Herbert, for Pinks.
- To Messrs. Kent & Brydon, for Irises.
- To Messrs. Laxton Bros., for Lupines.
- To Mr. R. C. Notcutt, for flowering shrubs &c.
- To Messrs. J. Peed & Son, for Gloxinias, &c.
- To Mr. G. Prince, for Roses.
- To Mr. G. Reuthe, for flowering shrubs.
- To Messrs. Waterer, Sons & Crisp, for Irises.
- To Messrs. W. S. Watney & Co., for Geraniums.
- To Aubrey Wootton, Esq. (gr. W. Lamson), for Pelargoniums.
- To Yokohama Nursery Co., for Japanese trees and gardens.

Silver Banksian Medal.

- To Mr. H. Chapman, for Irises.
- To Mr. H. N. Ellison, for ferns and palms.
- To Messrs. Jarman & Co., for Pelargoniums and Violas.
- To Messrs. Low, Stuart & Co., Australian and greenhouse plants.
- To Messrs. J. Piper & Son, for alpine plants.
- To Mr. A. D. Thompson, for alpine plants.
- To Messrs. Whitelegg & Co., for alpine plants.
- To Messrs. Whitelegg & Co., for Lilies.

Bronze Knightian Medal.

- To Messrs. S. Spooner & Sons, for Gooseberry and Currant trees in pots.

Bronze Banksian Medal.

- To The Misses Hopkins, for alpine plants.
- To Mr. C. H. Taudevin, for alpine plants.

SCIENTIFIC AND EDUCATIONAL TENT.

Silver Lindley Medal.

- To Professor V. H. Blackman, Imperial College of Science, for exhibit of apparatus used in investigating plant processes, &c.
 - To Mr. A. Hosking, John Innes Hort. Institution, for fruit-trees in pots, showing the effects of cross-fertilization in cases of self-sterility, &c.
 - To Mr. Wm. B. Brierley, Institute of Plant Pathology, Rothamsted, for culture of Fungi living in the soil.
 - To W. F. Bewley, Lea Valley Experimental Station, for diseases of Tomatos.
 - To Mr. Ronald G. Hatton, East Malling Fruit Experiment Station, South-Eastern Agricultural College, for fruit stocks experiments, &c.
- [Many other exhibits were made by the Royal Horticultural Society.]

GENERAL MEETING.

JUNE 15, 1920.

Mr. H. J. PAGE, B.Sc., in the Chair.

Three hundred and twenty-six Fellows and seventeen Associates were elected, and fifteen Societies affiliated.

A lecture on "Plants of Interest at the Meeting" was given by Dr. A. B. Rendle, F.R.S., V.M.H.

DEPUTATION TO YORK GALA.

THE following Deputation from the Council of the Society left London for York, viz. Messrs. Bilney, J.P., W. Cuthbertson, V.M.H., J. Hudson, V.M.H., H. B. May, V.M.H., and the Rev. W. Wilks, M.A., V.M.H. In the evening they were most sumptuously entertained at dinner by James Melrose, Esq., the President of the York Society, at which the Very Rev. the Dean, and the Lord Mayor and the Chancellor of the Diocese, and several other local celebrities were present to welcome the deputation.

The deputation were lodged at Harker's Hotel.

On Wednesday morning, at 10, the Deputation arrived on the show-ground and made awards as follows:—

First-class Certificate.

Odontoglossum × 'Doreen' *magnificum*, from Messrs. Mansell & Hatcher.

Award of Merit.

Cattleya × 'Hesta' *magnifica*, from Messrs. Mansell & Hatcher.

Odontoglossum × 'Emperor' var. 'Constantine,' from Sir Jeremiah Colman, Bt.

Iris 'Camma,' from G. Yeld, Esq.

Gold Medal.

Messrs. Mansell & Hatcher, for Orchids.

Messrs. Armstrong & Brown, for Orchids.

Sir Jeremiah Colman, for Orchids.

Messrs. Alex. Dickson, for Sweet Peas.

Messrs. Dobbie, for Sweet Peas.

Messrs. Sutton, for Sweet Peas.

Messrs. Allwood, for Pinks and Carnations.

Messrs. Waterer Sons & Crisp, for Rhododendrons.

Messrs. P. Gardner, for a rock-garden.

Silver-gilt Flora Medal.

Messrs. Cypher, for Orchids.

Messrs. Blackmore & Langdon, for Delphiniums.

Mr. H. Lakeman, for Border Carnations.

Mr. W. A. Holmes, for stove and greenhouse plants.

Mr. H. E. Leetham, for a water-garden.

Silver-gilt Banksian Medal.

Mr. J. Stevenson, for Sweet Peas.

Messrs. Cypher, for a group of plants.

Messrs. J. Backhouse, for a rock-garden.

Mr. W. Wells, for Delphiniums.

Silver Flora Medal.

Messrs. S. Broadhead, for rockwork.

Messrs. Harkness, for hardy flowers.

Silver Grenfell Medal.

Messrs. King, for Sweet Peas.

Messrs. W. Artindale, for hardy flowers.

Messrs. Harkness, for hardy perennial flowers.

XXX PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Silver Banksian Medal.

Messrs. Engelmann, for Carnations.

Messrs. Bide, for Sweet Peas.

Messrs. G. Gibson, for hardy flowers.

Messrs. G. Longster, for hardy flowers.

The Deputation, together with the judges, exhibitors, and the Dean and Chancellor, the Lord Mayor and Sheriff, and the Lord Mayor of Bradford, were entertained at luncheon on the show-ground; the President, James Melrose, Esq., in the Chair. After the President had proposed the King's health, the Dean of York proposed the R.H.S., to which the Rev. W. Wilks responded. The health of the exhibitors and judges was proposed by T. G. Hodgson Esq., Chairman of the York Society, to which W. Cuthbertson, Esq., responded for the former, and F. Jordan, Esq., for the latter. The Rev. W. Wilks subsequently proposed prosperity to the Grand Yorkshire Flower Show and Gala, which was responded to by N. T. Crombie, Esq. The principal guests then adjourned to the Committee tent, where coffee, &c., was served.

GENERAL MEETING.

JUNE 29, 1920.

Mr. W. A. BILNEY, J.P., in the Chair.

Seventy-nine Fellows and three Associates were elected, and six Societies affiliated.

A lecture on "Garden Roses" was given by Mr. H. R. Darlington (see p. 323).

PROVINCIAL SUMMER MEETING, CARDIFF.

JULY 7, 8, 9, 1920.

The meeting at Cardiff was an experiment, for no previous provincial show had been held by the Society for more than thirty years. When, however, the Lord Mayor of Cardiff and the Cardiff and County Horticultural Society invited the Royal Horticultural Society to hold its Summer Meeting in that city, the Council had little hesitation in deciding to do so. All who went to Cardiff agreed that the display of fruit, flowers, and vegetables was excellent, and it was unfortunate that the weather was so disastrously wet that the attendance fell short of anticipation. The Society is greatly indebted to Queen Auguste Victoria and King Manoel, who journeyed down to Cardiff in order to open the meeting. Our gratitude is also due to Mr. and Mrs. Wyndham Clark, of Talygarn, for their hospitality on the first day of the meeting, and to the officials and other members of the local Society for their help and hospitality. The success of the arrangements was in no small measure due to the advice and help so freely given by the Lord Mayor of Cardiff, Mr. G. Forsdyke, who did all that lay in his power to make the meeting a success.

The various lectures promoted by the Society during the meeting were well attended. The subject on the first day was "The Cultivation of Fruit," on which papers were read by Messrs. Chittenden, Lees, and Basham. On the second day, Dr. Rendle gave a most interesting discourse on "Plants of Interest shown at the Meeting," while on the third day Mr. W. Cuthbertson and Mr. H. V. Taylor read papers on various aspects of potato-growing.

The awards made at the meeting were as follows:—

Cups.

The Coronation Cup for the best exhibit. Awarded to Messrs. Allwood Bros.

The Wigan Cup for Roses. Awarded to Mr. Elisha Hicks.

The Gordon Lennox Cup for Fruit. Awarded to The King's Acre Nurseries.

The Cain Cup for the best exhibit by an amateur. Awarded to Reginald Cory, Esq.

Veitch Memorial Medal.

For Fruit shown by an Amateur. Awarded to S. H. Byass, Esq. (gr. R. German).

For Plants shown by an Amateur. Awarded to Lt.-Col. Sir George Holford (gr. A. Chapman).

Gold Medal.

- To State of Victoria, for fruit.
- To Messrs. Sutton & Sons, for Sweet Peas.
- To Messrs. Sutton & Sons, for Vegetables.
- To Messrs. Dobbie & Co., for Sweet Peas.
- To Mr. Ben Cant, for Roses.
- To Mr. Maurice Prichard, for herbaceous plants.
- To Messrs. Waterer, Sons & Crisp, for topiary work.
- To Messrs. Piper & Son, for water-garden.
- To Messrs. Blackmore & Langdon, for Delphiniums and Begonias.
- To Messrs. J. Cypher & Sons, for Orchids and foliage plants.
- To Mr. Herbert Jones, for formal garden.
- To Trevor Jones, Esq., for Gloxinias.
- To Mr. Amos Perry, for ferns and herbaceous plants.

Silver-gilt Hogg Medal.

- To Messrs. Bunyard & Co., for fruit-trees.

Silver-gilt Knightian Medal.

- To New Zealand Government, for Apples and Pears.
- To Messrs. Toogoods, Ltd., for Vegetables.
- To Messrs. Dobbie & Co., for Potatoes.

Silver-gilt Flora Medal.

- To Mr. Prince, of Oxford, for Roses.
- To Messrs. Godfrey & Son, for herbaceous plants and Pelargoniums.
- To Messrs. Stuart, Low & Co., for Carnations.
- To Messrs. Dickson & Sons, for Sweet Peas.
- To Messrs. Bowell & Skarratt, for alpiners.
- To Mr. M. C. Crossling, for Roses.
- To Mr. T. Lewis, for Rhododendrons, Kalmias, &c.
- To Messrs. W. Treseder, Ltd., for Roses.
- To the Donard Nursery Co., for rare trees and shrubs.
- To Messrs. G. G. Whitelegg & Co., for rock-garden.
- To Capt. J. F. Symonds Jeune, for rock-garden.

Silver-gilt Grenfell Medal.

- To J. W. Pyman, Esq., for Streptocarpus.
- To the South African Government, for fruit.
- To Messrs. Webb & Sons, for Vegetables.
- To Mr. James Douglas, for Carnations.
- To Messrs. Godfrey & Son, for Pelargoniums.
- To Messrs. J. Cheal & Sons, for shrubs.
- To Mr. J. C. Allgrove, for herbaceous plants.
- To Messrs. Barr & Sons, for herbaceous plants.
- To Messrs. W. Cutbush & Son, for Roses and Carnations.
- To Mrs. Neale, for Orchids.
- To Sir Jeremiah Colman, Bt., for Orchids.
- To Messrs. R. Russell & Sons, for stove plants.

Silver-gilt Banksian Medal.

- To Messrs. Bakers, Ltd., for formal garden.
- To Messrs. Jarman & Co., for Roses and Sweet Peas.
- To Messrs. Waterer, Sons & Crisp, for alpiners.
- To Mr. J. Macdonald, for Grasses.

Silver Flora Medal.

- To Mr. Stephen Treseder, for Roses.
- To Messrs. Walters & Son, for herbaceous plants and Roses.
- To Mr. C. Wall, for Carnations.
- To Mr. Vincent Slade, for Pelargoniums.
- To Messrs. J. Jefferies & Son, for Conifers.

Silver Grenfell Medal.

- To British South Africa Co., for Oranges.
- To the Rev. J. Pemberton, for Roses.
- To Messrs. Tucker & Sons, for herbaceous and alpine plants.
- To Mr. C. W. Herbert, for Pinks.
- To Mr. W. Wells, jun., for herbaceous plants.
- To Messrs. H. & W. Evans, for formal garden.

Silver Banksian Medal.

- To Messrs. Rich & Co., for herbaceous plants.
- To Mr. J. J. Kettle, for Raspberries.
- To Messrs. Maxwell & Beale, for alpine plants.
- To Messrs. B. Ladhams, Ltd., for herbaceous plants.
- To Mr. Clarence Elliott, for alpine plants.
- To Mr. H. N. Ellison, for ferns.

Bronze Banksian Medal.

- To Mr. H. Clarke, for herbaceous plants and Violas.
- To Messrs. Reamsbottom & Co., for Anemones.
- To Mr. J. H. Isaac, for Sweet Peas.
- To Messrs. J. Klinkert, for topiary trees.

Awards of Merit.

- To *Coreopsis grandiflora*, Perry's var. Shown by Mr. Amos Perry, Enfield.
- To Clove Carnation 'Blush Clove.' Shown by Mr. James Douglas, Great Bookham.
- To Begonia 'Lady Rhondda.' Shown by Messrs. Blackmore & Langdon.
- To Begonia 'Lady Cory.' Shown by Messrs. Blackmore and Langdon.
- To Sweet Pea 'Pink Pearl.' Shown by Messrs. Dobbie & Co.
- To Sweet Pea 'Orchid.' Shown by Messrs. Dobbie & Co.
- To *Campanula Bellardii* 'Miranda.' Shown by Mr. Clarence Elliott.

SCIENTIFIC SECTION.

Lindley Medal.

- To Ministry of Agriculture, for an exhibit of Diseases and Pests and Fruit-stock experiments.
- To University of Bristol, Long Ashton, for experiments. Demonstrations.
- To Mr. W. H. Farmer, for bottled fruits.

Silver Grenfell Medal.

- To Mr. S. Nicholas Hobby, for British timbers.

[The Royal Horticultural Society also made an extensive exhibit.]

GENERAL MEETING.

JULY 13, 1920.

The Rev. W. WILKS, M.A., V.M.H., in the Chair.

Ninety Fellows were elected and two Societies affiliated.

A lecture on "Plants of Interest at the Meeting" was given by Dr. A. B. Rendle, F.R.S., V.M.H.

GENERAL MEETING.

JULY 27, 1920.

Mr. F. J. CHITTENDEN, V.M.H., in the Chair.

Seventy-three Fellows and one Associate were elected, and two Societies affiliated.

A lecture on "Green Fly" was given by Mr. J. G. Blakey.

LICHFIELD.

AWARDS MADE BY THE DEPUTATION TO THE CENTENARY EXHIBITION,
AUGUST 2, 1920.

Messrs. F. J. Chittenden, V.M.H., W. R. Dykes, M.A. (Secretary, R.H.S.),
H. B. May, V.M.H., and Rev. W. Wilks, M.A., V.M.H.

Silver-gilt Knightian Medal.

To Col. F. Swinfen Broun, Swinfen Hall, Lichfield, for fruit and vegetables.

Silver-gilt Flora Medal.

To Col. F. Swinfen Broun, Swinfen Hall, Lichfield, for flowers and plants.

Silver Knightian Medal,

To W. W. Worthington, Esq., Maple Hayes, Lichfield, for fruit and vegetables.

Silver Flora Medal.

To A. W. Thorne, Esq., Short Butts Lane, Lichfield, for flowers.

Silver Grenfell Medal.

To A. B. Grove, Esq., Sutton Coldfield, for flowers.

To G. Courtiour, Esq., Lichfield, for plants and vegetables.

To J. Sherratt, Esq., 506 Station Road, Burton-on-Trent, for roses.

Silver Bankstan Medal.

To W. W. Worthington, Esq., Maple Hayes, Lichfield, for sweet peas.

Bronze Knightian Medal.

To Miss Salt, Starcroft, Lichfield, for vegetables.

To F. Allsopp, Esq., 25 Wheel Lane, Lichfield, for vegetables.

To F. D. Winterton, Esq., Rock House, Lichfield, for vegetables.

Bronze Banksian Medal.

To J. Burton, Esq., Lichfield, for plants.

To G. Barnes, Esq., 25 Wheel Lane, Lichfield, for vegetables.

To G. Ellett, Esq., Sandfields, Lichfield, for vegetables.

To Mary Button, St. Mary's Senior School, for wild flowers.

To Rose Sillitoe, St. Mary's Senior School, for wild flowers.

To Doris Johnson, St. Mary's Senior School, for wild flowers.

Certificates of Diligent Interest.

To Mary Button, St. Mary's Senior School, for wild flowers.

To Florence Sillitoe, St. Mary's Senior School, for wild flowers.

To Gladys Johnson, St. Michael's School, for wild flowers.

To Doris Johnson, St. Mary's Senior School, for wild flowers.

To Rose Sillitoe, St. Mary's Senior School, for wild flowers.

To Cedric Lees, Boys' Central School, for wild flowers.

To Mark Gregory Russell, Christ Church School, for wild flowers.

To William Egan, Boys' Central School, for wild flowers.

To Vera Corbett, St. Mary's Senior School, for wild flowers.

To Elsie Keen, Christ Church School, for wild flowers.

To Stephen Lees, Boys' Central School, for grasses.

To Walter Warren, Boys' Central School, for grasses.

To Winnie Foote, Christ Church School, for grasses.

To Nellie Thorpe, Christ Church School, for grasses.

GENERAL MEETING.

AUGUST 10, 1920.

Mr. H. B. MAY, V.M.H., in the Chair.

Twenty-three Fellows were elected.

GENERAL MEETING.

AUGUST 24, 1920.

Mr. C. G. A. Nix in the Chair.

Nineteen Fellows were elected.

The exhibition of hardy British-grown flower bulbs was held at this meeting, Mrs. Wallis Toller, The Anglesey Bulb Farm, and Mr. George Monro being the prize winners.

GENERAL MEETING.

SEPTEMBER 7, 1920.

Mr. W. R. DYKES, M.A., in the Chair.

Thirteen Fellows and one Associate were elected.

The open competition for the Foremarke Challenge Cup for Gladioli took place at this meeting, the winner being Messrs. Artindale, with Mr. G. Cave and Mrs. Churcher second and third respectively. The Cory Cup for Dahlias was not awarded.

GENERAL MEETING.

SEPTEMBER 21, 1920.

Mr. W. R. DYKES, M.A., in the Chair.

Two Fellows were elected.

A lecture on "Potato Problems" was given by Mr. W. Cuthbertson, J.P., V.M.H.

The Vegetable Meeting took place this day, the arrangements being according to the published schedule. The Sutton Challenge Cup was won by the Hon. Mrs. Greville, Mr. J. Jones of Ammanford being second. The Champion Challenge Cup was won by C. A. Cain, Esq.

GENERAL MEETING.

OCTOBER 5, 1920.

Sir ALBERT K. ROLLIT, LL.D., V.M.H., in the Chair.

One hundred and six Fellows and two Associates were elected, and three Societies affiliated.

A lecture was given by Mr. E. A. Bunyard, F.L.S., on "The Winter Study of Fruit Trees."

The Twenty-fourth Autumn Meeting for British-grown fruits was held this day, the arrangements being according to the published schedule. The Affiliated Societies Cup was won by the East Anglian Horticultural Club; the Bunyard Cup was not awarded.

GENERAL MEETING.

OCTOBER 19, 1920.

The Rev. W. WILKS, M.A., V.M.H., in the Chair.

Fifty-four Fellows and two Associates were elected, and one Society affiliated.

A lecture on "Plants of Interest at the Meeting" was given by Dr. A. B. Rendle, F.R.S., V.M.H.

GENERAL MEETING.

NOVEMBER 2, 1920.

Mr. E. A. BUNYARD, F.L.S., in the Chair.

Forty-four Fellows and two Associates were elected, and one Society affiliated.

A lecture on "Fruit-tree Stocks—Cherries, Plums, and Pears" was given by Mr. R. G. Hatton, M.A.

GENERAL MEETING.

NOVEMBER 16, 1920.

Mr. C. G. A. Nix in the Chair.

Forty-nine Fellows and three Associates were elected, and four Societies affiliated.

A lecture on "Sugar Beet" was given by Dr. F. V. Darbishire, M.A.

GENERAL MEETING.

NOVEMBER 30, 1920.

The Rt. Hon. Lord LAMBOURNE in the Chair.

Forty-three Fellows and one Associate were elected, and two Societies affiliated.

GENERAL MEETING.

DECEMBER 14, 1920.

The Rt. Hon. Lord LAMBOURNE in the Chair.

Fifty Fellows and two Associates were elected, and three Societies affiliated.

SCIENTIFIC COMMITTEE.

JANUARY 13, 1920.

Mr. E. A. Bowles, M.A., in the Chair, and seven members present.

British plants.—Mr. Fraser showed preserved specimens of *Senecio squalidus*, a plant well known for long as growing upon Oxford walls, but now spread to other places, including London. He also showed a hybrid between *S. squalidus* and *S. viscosus*, originally from Ireland, and *Mercurialis annuus*, a weed of cultivated gardens in several parts of south and east England.

Pleione pogonoides.—Mr. Elwes said that he had been cultivating plants under this name, but had found them to be identical with *Pleione humilis*, so far as he had been able to discover.

Oncidium × *incurnephorum*.—Mr. G. Wilson showed on behalf of Messrs. Charlesworth a hybrid between *Oncidium corynephorum*, a species with a scandent habit, and *O. incurvum*. The hybrid lacks the climbing habit.

Fruits of Davidia.—Mr. Bowles showed twin fruits of *Davidia involucrata* from the garden of Mr. Christie at Framlingham Pigot, Norfolk. The inflorescences producing these twin fruits had three bracts, and the phenomenon had occurred in earlier years as well as in 1919.

Two forms of berry on Holly.—Mr. Bowles also showed a piece of holly bearing a red berry on an otherwise yellow-fruited plant.

Cypripedium insigne twin-flowered. —Mr. Smith of Hatchford Park Gardens, Surrey, sent several specimens of *Cypripedium insigne* having two flowers on a scape. The plants producing them were particularly vigorous and the flowers lacked nothing in size. The plants had been manured occasionally with sulphate of ammonia.

SCIENTIFIC COMMITTEE, JANUARY 27, 1920.

Mr. E. A. Bowles, M.A., in the Chair, and thirteen members present.

Various Plants.—Mr. H. J. Elwes showed from his garden and commented upon *Petasites alba*, a high alpine, and *P. japonica* from Kamtschatka; *Lysionotus warleyana*, the curious capsules of which take six months to ripen; *Cotyledon roseatum*, a nearly hardy plant, flowering in mid-winter, and with brightly tinged foliage; the hybrid *Iris persica* × *sindjarensis*, the only Juno Iris which persisted in his garden; *Rehmannia Henryi* from Ichang; *Aeschynanthus lobatus*, the corolla of which remains in 'bud' until the calyx tube is well developed, as is the case in *Columnea*; *Pleione humilis* in two distinct forms; *Tanaea penangiana*, an uncommon orchid, and *Heeria vittata*, a nearly hardy plant from Sikkim.

Alder catkins.—Mr. Bowles showed catkins of a distinct Alder, *Alnus cordata*, and drew attention to the differences between that species and *A. glutinosa*.

Viburnum fragrans.—Mr. Bowles also showed flowers of this new species from China; he remarked that the plant was not only very sweetly scented but floriferous, and that, although it produces its flowers in January, it will withstand frost uninjured.

The Functions of the Committee.—Mr. Elwes raised certain points in connexion with the work of the Committee, and after discussion it was resolved "That this Committee desire to express the hope that the plants now reaching Great Britain from Forrest's collections shall be adequately described and illustrated in the Society's JOURNAL, and they wish also to express their willingness to do their utmost towards this end."

SCIENTIFIC COMMITTEE, FEBRUARY 10, 1920.

Mr. E. A. Bowles, M.A., in the Chair, and four members present.

Willow Seeds.—Mr. J. Fraser remarked upon the part played by the wind in the distribution of the seeds of the willow.

Primula juliae × *elatior*.—Dr. Rosenheim showed specimens in illustration of the following note: A reciprocal cross was made between *P. juliae* and *P. elatior*

in Spring 1917. Only the seeds obtained from *P. Juliae* as the female parent were fertile. Sixty-eight seeds were sown, of which twenty-six germinated; of these twenty flowered for the first time in 1919. The foliage in all cases shows the characters of both parents (petiolate and rounded, *P. Juliae*; puckered, *P. elatior*). The inflorescence was of the *P. Juliae* type in ten plants, and of the *P. elatior* type in the other ten. While all the plants of the *P. Juliae* type had pink flowers, those of the *P. elatior* type had yellow inflorescence in six cases and pink in four cases. Seedlings of the F₂ generation are being grown on. The plant shown is one of the early flowering F₁ generation, showing flowers of *P. Juliae* character. (Plants in the open have been in flower since December.) The only known crosses of *P. Juliae* × *P. elatior* seem to be chance seedlings found at Kew, which have the inflorescence of *P. elatior*.

Snowdrop Seedlings.—Mrs. R. O. Backhouse sent flowers of seedling snowdrops illustrating the second generation of the cross *G. plicatus* × *G. nivalis*. The flowers were exceedingly fine and presented great variation, some being like fine examples of *G. Elwesii*, and others of the *nivalis* or *plicatus* type, while one approached *G. Melvillei*.

Early-flowering Crocus vernus.—Mrs. Backhouse also sent seedlings of Dutch Crocuses selected for earliness, and now in full flower.

SCIENTIFIC COMMITTEE, FEBRUARY 24, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, seven members, and Mr. JARDINE, visitor, present.

Comparison of Juglans and Pterocarya Nuts.—Mr. J. Fraser showed specimens in illustration of remarks upon the development of the seeds of *Juglans* and *Pterocarya* and compared the two seeds.

Narcissus eelworm.—Mr. Jardine exhibited a series of seedling plants, some of which had been attacked by the *Narcissus* eelworm. He had watered the soil with a solution of one part of corrosive sublimate in 3,000 of water, afterwards applying nitrate of soda. The plants had grown away vigorously subsequently, and Mr. Jardine believed the eelworms to be destroyed. The Committee desired to see the bulbs later on, since the extent of the attack is not readily seen in its early stages in the leaves at this season of the year.

Types of Black Currants.—Miss Bunyard showed a series of drawings of black currants to illustrate the various types met with in that species. The Committee thanked Miss Bunyard and complimented her upon their clearness and excellence.

Various plants.—Mr. G. W. W. Blathwayt sent a number of flowers from the open garden at the Cottage, Porlock Weir, Somerset, including *Acacia dealbata*, *A. falcata*, *Coronilla valentina*, *Daphne odora*, and *Leptospermum scoparium*. A vote of thanks was accorded Mr. Blathwayt.

Bulbous plants.—Mrs. Backhouse sent a further series of Snowdrop seedlings and Chionoscillas with the parents *Scilla bifolia* and *Chionodoxa sardensis*.

SCIENTIFIC COMMITTEE, MARCH 9, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, seven members, and Messrs. CRANE, JARDINE, and Rev. J. JACOB, visitors, present.

Primula crosses.—Messrs. Baker of Wolverhampton showed a cross between *Primula acaulis* and *P. Juliae* with dark purplish-red flowers and leaves like those of *Primula Juliae*, and also *Primula Juliae* × *P. elatior* with pinkish flowers, very similar to the form shown by Dr. Rosenheim a few meetings since.

Variegation of stem in Freesia.—Rev. J. Jacob showed a variety of *Freesia* with orange flowers, the lower part of the stem of which showed alternating bands of darker and paler green. These were deferred for further examination.

Pruning &c. of seedling fruits.—Mr. A. Worsley gave an account of his observations upon the growth of seedling fruits of various kinds, including apples, pears, plums, peaches, and apricots, and remarked upon methods of pruning such seedling trees and upon the characteristics of certain seedling fruits as compared with their parents.

Veltheimia viridifolia.—Mr. Blaythwayt of Porlock sent a specimen of this interesting Cape bulb. It is nearly hardy but not quite, frost being fatal to it.

SCIENTIFIC COMMITTEE, MARCH 23, 1920.

Mr. E. A. Bowles, M.A., in the Chair, and eleven members present.

Leersia oryzoides.—Mr. J. Fraser showed specimens of this very rare plant from its British localities.

Propagation from Orchid flowering-spike.—Mr. J. Wilson showed pieces of flowering spikes of *Phalaenopsis*, *Cattleya*, &c., showing propagation from these. Sir Everard im Thurn remarked that the formation of vegetative shoots from flowering spikes of orchids growing in a wild state was frequent.

Proliferous Primrose.—Mr. Chittenden showed specimens of primrose having at the apex of the scape a flower with perianth pieces of the form of bracts, from the axils of which flowers had developed.

Various Flowers.—Mr. H. J. Elwes sent a list of many plants now in flower in his garden: *Anemone ranunculoides*, *A. fulgens*, *A. blanda* var. *scythinica*, next to *Chionodoxa*, the most lovely weed and the most harmless in the garden; very varied forms from Algeria of *A. coronaria*; *Adonis vernalis*; *Corydalis thalictroides*, also a weed but a very pretty one; *C. Allionii*; *Cardamine trifolia*; *Draba imbricata*; *Daphne Mezereum* var. *alba*; *D. Blagayana*; *Iberis petraea*; *Gentiana acaulis*; *Isopyrum thalictroides*; *I. grandiflorum*; *Megasea* sp. from China (pink-flowered), *M. afghanica*?; *Pavrya Menziesii*; *Primula marginata*, *P. Juliae*, *P. rosea*, *P. denticulata*, *P. Loczii*, *P. Auricula*, *P. × marven*; *Pulmonaria angustifolia*; *Shortia grandiflora*; *Sanguinaria canadensis*; *Trillium grandiflorum*, but a very early one only, the common form being not yet up; *Erythronium Nuttalianum*; *Galanthus Ikariae* (the others over flowering); *Fritillaria Imperialis* var. *inodora*; *F. Siehana*; *Muscari*, several sp.; *Korolkowia Sewerzowi*; *Iris stylosa*, better than ever before; *Ornithogalum*, several sp.; *Tulipa Kaufmanniana*; *Puschkinia scilloides*; *Tecophilaea Cyanocrocus*.

SCIENTIFIC COMMITTEE, APRIL 13, 1920.

Mr. E. A. Bowles, M.A., in the Chair, and twelve members present.

Certificate of Appreciation.—A Certificate of Appreciation was unanimously recommended to Mrs. Backhouse for her work with Daffodils.

Various plants.—Mr. H. J. Elwes showed plants as follows:—Plants in a Cotswold garden 530 feet above sea level. During forty-eight years I can never remember a spring so early and so free from east wind and frost as the last month has been. The number of flowers out and coming out is quite unusual, and as I may never see the like in April again I will mention a few of the most beautiful and less common. The three flowering shrubs, though not at their best most beautiful, are *Berberis Darwinii*, which was nearly killed three years ago; *Viburnum Carlesii*, which has not as yet gone through a real Cotswold winter; and *Prunus nana*, perhaps the choicest and neatest little bush that ever came here from Bitton. *Anemone scythinica* is seeding itself everywhere, and is one of the most beautiful and least harmful weeds in cultivation. *Anemone alpina* from seed, not yet fully established, but seems to like a rich border; *Corydalis bracteata*, another beautiful weed which comes up everywhere but not very easy to pull up; *Daphne Mezereum* and var. *album*, which comes true from seed, and comes up in many places but is not long-lived here; *Daphne Blagayana*, nearly over (keep on earthing up the young growths); *Euphorbia polychroma*, *Myrsinites*, and *pilulifera*, all pretty, early, and hardy border or rock plants; *Armeria caespitosa*; *Sedum Palmeri* and *Sedum Treleasii*, both very pretty and doubtfully hardy; *Geum Rossi*, a New Zealander, pretty but not very floriferous; *Androsace sarmentosa*, the earliest of its section and one of the best; *Paeonia Mlokosewitschi*, the best and earliest yellow pæony; *Paeonia Cambessedesii*, the best and earliest purple pæony; *Paeonia cretensis*, the best and earliest white pæony. None of these are fully out, but the buds show colour; a frost would ruin them now, but they are so good and rare that they are worth protection. *Ourisia macrophylla*, close under a north wall, shows precocious buds; it is doubtfully hardy here. *Smilacina paniculata*, a wonderfully strong plant already in bud and four feet high. This was raised from seed that I gathered at Niagara Falls. *Arnebia echinoides*, a month before its usual time. *Dentaria pinnata*, a very beautiful plant; but the white variety is even better. Can anyone send me the latter, which is common in Cornish gardens? *Stylophorum japonicum*, a good doer in my garden; *Jeffersonia dubia*, a very pretty plant, which, however, does not thrive in my soil and does at Kew; *Epimedium* sp., which I have under the name of *sulphureum*; *Potentilla alchemilloides*, a pretty

dwarf white rock plant from the Pyrenees; *Primula Loczii*, more curious than beautiful. In a frame *Ramondia Nataliae*, which is not so good as *R. pyrenaica*. *Haberlea Ferdinandi* and *H. virginialis*, pure white and very pretty. Among Megaseas the most showy is a fine form of the old Siberian *M. cordifolia*, which is much more floriferous on the top of a dry rock as I saw it in the Altai Mountains than in a border. A pretty pink one which I raised from Chinese seed would, as Mr. Bowles thinks, be called 'Stracheyi,' if it came from the Himalayas. Bulbous plants in flower are too numerous to mention. Among the best are *Scilla lilio-hyacinthus* and its var. *alba*, which I owe to the late Mr. Boyd of Faldonside. Why it is uncommon I know not, for it increases fast and is very hardy. *Muscari macranthum*, best perhaps in a frame where its very fragrant flowers are more numerous than outside; a plant which I have had for forty years, and which has very large bulbs which do not increase like most of the *Muscari*. *Tulipa dasystemon*, a free-flowering and pretty little species, has a better constitution than any tulip I know except *T. saxatilis*, which spreads and increases much more freely than it flowers; *Coelogyne flaccida*.

Veronica x lobelioides.—Mr. Fraser showed specimens of *Veronica x lobelioides* (V. 'Blue Gem') and commented upon the history of this plant, which was sent to Kew on April 28, 1862, by Mr. J. A. Henry the raiser, and to Messrs. Veitch, with the statement that its parentage was *V. decussata* x *V. speciosa*. It was awarded F.C.C. in 1862 when shown by Mr. Warren, a nurseryman of Salisbury.

SCIENTIFIC COMMITTEE, APRIL 27, 1920.

MR. E. A. BOWLES, V.M.H., in the Chair, and seven members present.

White-berried Aucuba.—Mr. Arkwright showed branches carrying many berries of the white-fruited form of *Aucuba japonica*.

Primrose 'Evelyn Arkwright'.—He also showed flowers of this fine primrose, and said that all the seedlings of it which he had seen, as well as the original plant, were pin-eyed.

Cheiranthus x .—He also showed flowers of the hybrid *Cheiranthus*, which has been before the Society on several occasions, and drew attention to the prevalence of purple buds in this form, whereas those in some others of similar ancestry had yellowish or paler buds.

Hybrid Irises.—Mr. Dykes showed a series of hybrid *Irises* which he had raised, and briefly commented upon their peculiarities. In *Iris Alberti* the veining stops short upon the falls, and this character is handed on to its offspring. When crossed with *I. pallida* the early-flowering characteristics of *I. Alberti* are retained. *I. Korolkowi* x *I. atrofusca* gave a fine deep red-purple flower. Seedlings of *I. stolonifera* produced flowers with either a blue or a yellow beard. He showed also *I. stolonifera* x *I. lutescens* and *I. Susiana* x yellow *lutescens*, the latter distinctly showing the veining characteristic of *I. Susiana*. *I. flavescens* is said to be a garden form of *I. variegata*, but it has been confused in gardens with *I. imbricata* of Lindley (which has also a purple form), a very distinct plant in its spathes &c. *I. Korolkowi* x purple *chamaeiris* gave a tall flower-spike with flowers having falls curiously curved under.

Chinese plants.—Mrs. DuCane Godman and Col. Stephenson Clarke both sent flowering plants of some of the Chinese plants raised from seeds of Mr. Forrest's collecting—*Primulas* in the one case, *Meconopsis* in the other.

Hybrid Rhododendrons.—Mr. Magor of St. Tudy sent hybrid *Rhododendrons*, three of which showed inheritance mainly from the pollen parent's side, viz. *Rhododendron*?, probably a natural hybrid between *R. chartophyllum praecox* or *yunnanense* x *rubiginosum* (Forrest No. 5874); *R. x ambkeys* (*R. ambiguum* x *R. Keysii*); *R. x yuncinn* (*R. yunnanense* x *R. cinnabarinum*); and *R. x oreocinn* (*R. oreotrophes* x *R. cinnabarinum*). The last three were raised by the exhibitor. Votes of thanks were unanimously accorded to the exhibitors of these and the foregoing plants.

SCIENTIFIC COMMITTEE, MAY 11, 1920.

MR. E. A. BOWLES, M.A., F.L.S., in the Chair, seven members, and Mr. MARSDEN JONES, visitor, present.

Carnation foliage malformed.—Mr. W. C. Worsdell showed some *Carnation* leaves with curious horn-like lateral outgrowths, the origin of which was doubtful.

Tulip with bulb in leaf-axil.—He also showed a tulip with a bulb in the axil of the leaf.

Sports from root-cuttings.—Dr. Bateson showed a *Pelargonium* raised from a root-cutting of the variety 'Ascot,' which has a rolled-back petal with magenta spots on a white ground, whereas the plant raised from the root-cutting had a flat petal, larger than the parent, with a large purplish spot. Of four root-cuttings raised at Merton three had proved different from their parents.

Cheiranthus × *Marshallii*.—Mr. Marsden Jones showed a branch from his pale-budded hybrid with pale flowers similar in colour to those of *C. alpinus*, but of the size of the hybrid. He also showed some hybrid Tulips.

Iris Seedlings.—Mr. Dykes showed seedlings of *Iris* 'Kharput' having a long fall and of *I. germanica* with inflorescence branching from the base with an herbaceous spathe. The habit, evergreen character of foliage, and partially herbaceous spathe of *I. germanica*, have led Mr. Dykes to conclude that *I. germanica* is not a really wild plant, and the nature of the seedlings suggests that *I. aphylla* is one of the parents, but the other parent is unknown.

Rhododendrons.—Mr. Magor, of Lamellen, St. Tudy, sent the following rare *Rhododendrons*: *R. campylogynum*, collected by Forrest on the Tali Range, a dwarf undershrub, the seedlings raised by Mr. J. C. Williams; *R. apodectum*, also of Forrest's collecting, raised by Mr. Magor, from the Shweli-Salween Range, a shrub of 4 feet to 6 feet; *R. ledoides* from Yunnan, a shrub of 2 feet; and *R. sp. ?*, related to *Azalea indica*, from the Chutong Hills. The last two both raised by the exhibitor. Mr. M. Yorke sent a plant called *R. edgarianum*, which bore dark violet-purple flowers and was strongly aromatic. The Secretary was desired to send votes of thanks to the exhibitors of these interesting plants.

SCIENTIFIC COMMITTEE, JUNE 1, 1920.

Mr. E. A. BOWLES, M.A., F.L.S., in the Chair, and five members present.

Wheat-ear Carnation.—Mrs. F. E. Longhurst sent a shoot of *Carnation* of the variety 'Congress,' showing the well-known 'wheat-ear' formation in a marked manner.

Various plants.—Mr. H. J. Elwes, F.R.S., showed examples from his garden of *Blandfordia superba*, a seedling *Eremurus* with sessile flowers; *Dianella tenuissima*, which bears deep indigo-blue berries; *Littonia modesta*; *Paeonia decora* (= *P. lobata*, but the nomenclature of these species appears to be involved); *P. Broteri* from Portugal; *Eria ornata*, the leaves of which appear to be normally orange, a native of Borneo; *Tricyrtis latifolia*, which Mr. Hales stated had grown outdoors at Chelsea uninjured for seven years; *Habranthus sp.*, which failed to flower until mulched with leaf-mould, after which it grew and flowered well.

Aquilegia hybrid.—Mr. Marsden Jones showed a hybrid between *Aquilegia vulgaris* and *A. canadensis*, showing the characters of both, which he had named *A. × vulcan* var. *Phyllis*.

SCIENTIFIC COMMITTEE, JUNE 15, 1920.

Mr. J. W. ODELL in the Chair, and three members present.

Hen and Chickens Marigold.—Mr. Chittenden showed a *Marigold* (*Calendula*) with subsidiary stalked capitula arising from the base of the main capitulum as in the 'Hen and Chickens' Daisy.

Hybrid Lilies.—Mr. A. Perry showed several hybrid Lilies raised by him, namely, *Lilium* × *Perryi* (*L. Washingtonianum* × *L. Roezlii*) and the reverse cross, *L. × Bowlesianum* (*L. Roezlii* × *L. Washingtonianum*), and *L. × Balfourianum* (*L. Roezlii* × *L. pardalinum*). A Certificate of Appreciation was unanimously recommended to Mr. Perry for his work in raising these hybrids.

Tilia with four cotyledons.—Mr. J. Fraser showed a seedling of *Tilia platyphyllos* with four cotyledons. He considered this condition to be due to the coherence of two embryos. He found it growing upon Leatherhead Downs.

SCIENTIFIC COMMITTEE, JUNE 29, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, and eight members present.

Gall on Yew.—Mr. J. Fraser showed galls on yew due to *Cecidomyia taxi*.

Silver-leaf on Sloe.—He also showed a specimen of silver-leaf on sloe, collected from a plant wild on Fetcham Downs.

Stool shoots of Populus canescens.—Mr. Worsley drew attention to the large foliage of stool shoots of *Populus canescens*, some of the leaves measuring up

to 9 inches in diameter. He also drew attention to what he considered a case of infectious variegation in ivy. The green shoot of an ivy had become variegated when growing near one of *Hedera Helix* var. *argyryneura* in his garden.

Inheritance in Sweet Peas.—Mr. W. Cuthbertson showed crosses between the Sweet Pea 'Etta Dyke' (which has an open keel) and 'Constance Hinton.' In F_1 , all the progeny had open keels and were white, while F_2 gave about one to three of a decided pink colour. 'Etta Dyke' is white. 'Constance Hinton' white with buff edges and dark leaf axils. The cross 'Etta Dyke' \times 'Nora Unwin' in F_1 gave all whites with compressed keels, and F_2 gave all whites. 'Constance Hinton' \times 'Nora Unwin' gave in F_1 all whites, but showing buff in the standards, and all with compressed keels, and in F_2 pinks as in the first case ('Etta Dyke' \times 'Constance Hinton').

Trifolium stellulatum.—Mr. H. Roberts showed a plant of *T. stellulatum* raised in his garden at Oxted through several generations from seed originally collected at Hythe. The plant had reached large proportions. On the suggestion of the Floral Committee a Botanical Certificate was unanimously recommended to this plant.

Double Papaver orientale.—Mr. Bowles showed a flower of *Papaver orientale* in which the petals were three-ranked and in which the capsule had split and had developed petals from the interior.

SCIENTIFIC COMMITTEE, JULY 13, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, and six members present.

Various Fruits.—Mr. Bowles showed fruit of *Erodium gruinum* to illustrate the action of the awn in burying the seed. He also showed fruit of *Viburnum fragrans*, now fruiting in his garden. Mr. Farrer had reported the fruit of this shrub to be edible, but it is very small.

White-fruited Elder.—Mr. Fraser showed examples of the white-fruited form of the common elder which he had found growing wild near Ashted Common, Surrey.

Hybrid Lily.—Mr. Dykes showed a hybrid between *Lilium speciosum* \times (*L. sulphureum* φ \times *L. regale*). The flower as shown had no particularly remarkable characteristics.

Leaf Division at Will.—Colonel Rawson showed a *Tropaeolum tuberosum* stem, the leaves of which, he stated, had been divided at will by selective screening, thus repeating the experiment of a previous year. In addition, leaves which opened three-lobed had been made four-lobed within three days, and if two leaves developed at the same node they were not necessarily divided alike. He also showed petals of a Hugh Dickson Rose, whose change of colour to an indigo-crimson "had been traced to the reduction in the water supply by a caterpillar living among them."

SCIENTIFIC COMMITTEE, JULY 27, 1920.

Mr. E. A. BOWLES in the Chair, with three members and Mr. E. H. WILSON (visitor) present.

Fertilization of Arum maculatum.—Mr. Marsden Jones showed a series of photographs illustrating the part played by two-winged flies in carrying pollen to stigma in the common wild Arum.

SCIENTIFIC COMMITTEE, AUGUST 24, 1920.

Mr. J. W. ODELL in the Chair, with five members present.

The late Dr. J. G. Baker.—The Committee learned with great regret that their oldest member, the only survivor of the members of the original Scientific Committee formed in 1865, Dr. J. G. Baker, F.R.S., had passed away. They unanimously desired the Secretary to convey to his family their condolences and an expression of the great regard in which Dr. J. G. Baker's life-work and personality were held.

Astelia nervosa.—Mrs. C. Brown sent an inflorescence of this New Zealand plant, which is rarely seen in cultivation, and a leaf. The latter was over six feet in length, and the former had apparently ripe fruit as large as small peas

of an orange colour, but as usual in staminate inflorescences of this plant, containing no seeds.

Flowering of Lilium philippinense.—Mrs. Brown also referred to the rapidity with which seedlings of *L. philippinense* reach flowering size. Plants raised from seed flowered within fifteen months of the germination of the seeds.

Various Plants.—Mr. H. J. Elwes showed a number of plants from his garden, including *Campanula Vidalii*, a rather tender species with a stem somewhat woody at the base, an unnamed species of *Allium* collected by Captain Bailey in Tibet, which spreads by means of rhizomes, and is related to *A. Wallichianum*; *Urceocharis Clibranii* which is said to be of hybrid origin, but which bears a somewhat close resemblance to a plant sent home from South America by Forget; *Roscoeia Humeana*, a Chinese species which Mr. Elwes regards as a finer plant than *R. purpurea*; and *Phlomis spectabilis*, an uncommon species.

SCIENTIFIC COMMITTEE, SEPTEMBER 7, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, two members and Dr. R. GATES present.

Starch Roots in Oxalis.—Sir Archibald Hepburn sent a tuber of *Oxalis adenophylla* with a starch root such as is formed in many species of *Oxalis*.

Hybrid Oenotheras.—Dr. R. R. Gates showed a series of hybrid *Oenotheras* and commented upon them as follows: This is a series of hybrids between *Oenothera rubricalyx* and certain wild species. *O. rubricalyx* is distinguished by having deep red instead of green buds. A single plant of this type appeared in my experimental cultures as a mutation in 1907, and all red-budded *Oenotheras* in cultivation are, without exception, descended from this plant and various crosses subsequently made with its descendants. *O. rubricalyx* was a mutation from *O. rubrinervis*, which in turn was derived in the cultures of de Vries from *O. Lamarckiana*. In its offspring this rubricalyx plant behaved at first as a simple Mendelian dominant, giving 3 red-budded to 1 green-budded offspring. In later generations a complication was introduced in the appearance of 15:1 ratios in addition to 3:1, indicating the appearance of a second factor for red. A pure race was also obtained by inbreeding, and in 1912 Messrs. Sutton acquired seeds of it (partly crossed with *O. grandiflora*) and introduced it into horticulture under the name 'Afterglow.'

Although evening Primroses have been in cultivation since 1614, this ornamental red variety has appeared but once, showing the great rarity of this mutation. In crosses this character of red buds always behaves as a dominant though differing somewhat in the details of its behaviour in species crosses. Among the numerous hybrids with other species and varieties which have been made in my experiments, the following were shown:—

(1) *O. Hewettii* × *O. rubricalyx*, F₂.

O. Hewettii from Colorado is an exceptionally tall species with large flowers. This hybrid has very good horticultural characters, and an F₃ generation will be grown for further study and to select a race which is pure for dark-red buds.

(2) *O. rubricalyx* × *O. Hewettii*, F₁.

The buds are a clear red, and the plants have a fine pyramidal habit of branching.

(3) *O. Novae Scotiae* × *O. rubricalyx*, F₁.

O. Novae Scotiae (Gates) was recently described from Nova Scotia. It has very small flowers and in the F₁ hybrids the size of petal is intermediate. The red buds, however, give a very ornamental effect, and the F₂ generation will no doubt yield plants with larger flowers.

(4) *O. rubricalyx* × *O. biennis*, F₄.

A number of families from this cross, inbred for three generations, yield uniform offspring with dark red buds, differing somewhat in size of flower.

(5) Various hybrids of rubricalyx with green-budded forms give races with uniformly pale-red buds.

SCIENTIFIC COMMITTEE, SEPTEMBER 21, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, with four members present.

Corm of Cyclamen.—Mr. H. J. Chapman sent a corm of *Cyclamen neapolitanum* to illustrate the large size these corms attain. It was planted forty years ago, and had grown and flowered well ever since, and now measured 8 inches in diameter.

Geranium pratense.—Rev. W. Wilks showed flowers of a lilac shade with many darker veins marked as they are in *G. striatum*. In other characters this plant appeared to resemble *G. pratense* and had been found some time since in Wensleydale.

Acidia in Cabbage.—Mr. Rainbow sent a very perfect funnel-shaped leaf of red cabbage measuring about 6 inches in length and $2\frac{1}{2}$ across the open mouth.

SCIENTIFIC COMMITTEE, OCTOBER 5, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, with seven members present.

Eleutherococcus Henryi.—Mr. R. C. Notcutt, of Woodbridge, sent fruiting branches of this interesting Chinese Araliad from his nursery at Woodbridge.

Various Plants.—Mr. Elwes showed flowering plants of *Calliphruria subdentata* for comparison with the supposed hybrid *Urceocharis Clibranii* to which it bears a great resemblance; *Rhyncanthus latifolius*; *Hedychium yunnanense* (a very sweet-scented species); *H. Greenii*, which appears identical with *H. Elwesii*; *Tricyrtis subhirtella*.

Germination of Lonicera Hildebrandtii.—Mr. Sidney Morris had been experimenting with seed of *Lonicera Hildebrandtii* with the following results:—

Dates of Sowing.

- | | |
|---|-----------------|
| 1. Dec. 17, 1919, in sandy loam in heat, 12 seeds. | No germination. |
| 2. „ 29, 1919, same compost under cooler conditions, 12 seeds | „ |
| 3. Jan. 14, 1920, with pulp attached, same compost, 12 seeds. These decayed much more quickly | „ |
| 4. Jan. 20, 1920. Exposed for short time after removal from ovary and placed in propagating frame | „ |
| 5. Feb. 10, 1920. Cleaned seeds taken from plant Nov. 1919 and kept in store till sowing time. They were much shrivelled. Sown in pure sand, 12 seeds | „ |
| 6. Feb. 25, 1920. Taken from plant at pruning time. The capsules were very dry. Sown in brisk heat by placing on hot-water pipes | „ |
| 7. Sept. 16, 1920, 12 seeds of present season, taken from plant, cleaned and sown same day in sandy loam and placed in heat. On the fourth day the radicle was descending. Five appeared above the soil on September 29, 1920 | 5 germinations. |

SCIENTIFIC COMMITTEE, OCTOBER 19, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, with seven members present.

Proliferous Onions.—Mr. J. Fraser showed onions which he had raised from onion bulbs produced in 1919 at the apex of a flowering sport of onions. These had flowered and had themselves produced a number of small bulbs among the flowers.

Tricotyledonary Apple Seedling.—He also showed a seedling apple which had produced three cotyledons, but in which the leaves occupied a normal position.

Vegetation of Kew Green.—Mr. Fraser also produced lists of plants which he had found on Kew Green, including forty which he considered native there, twenty-three woody plants (including Dates, Oranges, Locust, Plane), which had been introduced by various agencies, and eighty-eight herbaceous plants which he did not regard as native.

Proliferous Scabious.—Dr. Voelcker showed flower-heads of *Scabiosa atropurpurea*, each of which had produced a leafy shoot from the centre of the capitulum.

Fasciated Chrysanthemum.—Mr. Bowles showed from Mr. Dunton, Penn, Wolverhampton, a curious flattened fasciated growth of the common Chrysanthemum, spreading from a round basal point into a fan-like structure about $4\frac{1}{2}$ inches across.

Certificates of Appreciation were recommended to Miss Breeze, of the School of Agriculture, Cambridge, for work done in investigating the heredity of blight

and wart resistance in potatoes; and to Pantia Ralli, Esq., for work in raising *Brassolaeliocattleya* \times *citrina*, the result of a cross of a *Brassolaelia* with *Cattleya citrina*, producing a lemon flower with a fringed labellum and a downward tendency of growth.

SCIENTIFIC COMMITTEE, NOVEMBER 2, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, and seven members, with Mr. E. A. BUNYARD and Mr. CRANE, visitors, present.

White and Grey Poplars.—Mr. J. Fraser showed specimens to illustrate the differences between these two species, especially referring to *Populus alba* var. *nivea*, recognizable by its small catkins, of which only the female form is known in England, the male occurring in the Channel Islands, and to the thicker and more clumsy branches of *P. canescens*, the catkins of which are long. Both species show parallel variations in the amount of tomentum.

Pear-shaped Sport of Apple.—Mr. Bunyard showed an apple of the variety 'Houblon,' remarkably like a pear in shape, similar to sports which had been shown at previous meetings and to the pear-apple, in which variety, however, the form is constant.

Variation in Leaves of Raspberry.—Mr. Bunyard also showed a piece of a raspberry cane giving rise from a sucker to a flat-leaved spring growth, whereas the principal canes were almost smooth and the leaves curled and crinkled. Such canes were generally regarded as seedlings or rogues, and destroyed, but it was not clear whether they were different, because one was juvenile, the other aged, or produced at a different season, or whether we have to deal with a chimera.

Variation in Apples.—Mr. Crane showed fruits of Cox's Orange Pippin from different trees, to illustrate the remarkable range of variation seen in this fruit. One was very highly coloured and the other orange, sometimes with red streaks, sometimes without. Both were from orchard-house trees.

Apple-blossom Weevil.—Mr. Chittenden showed, on behalf of Mr. G. Fox Wilson, a photograph of some Apple-blossom Weevils on an apple branch, to illustrate the efficient manner in which their colouring hides them. Many pass summer and winter there hidden, others are found among the roots of grasses.

SCIENTIFIC COMMITTEE, NOVEMBER 16, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, and five members present.

Fruit of Feijoa Sellowiana.—Mr. E. A. Bowles showed specimens of this highly aromatic fruit from Mr. Woodward's garden at Nice. This Myrtaceous shrub is not very hardy in England, but where it grows it flowers freely.

Weevil Galls of Turnips.—Mr. Chittenden showed, on behalf of Mr. G. Fox Wilson, photographs of galls on roots of Turnips, caused by the weevil *Ceutorhynchus sulcicollis*. The galls had been bitten through and the larvæ which they contained eaten by mice and birds.

The late Mr. Reginald Farrer.—The Committee unanimously desired to express their condolence with the late Mr. Farrer's parents in the loss which they and horticulture have sustained through his untimely death in Upper Burma.

SCIENTIFIC COMMITTEE, NOVEMBER 30, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, and six members present.

Mints.—Mr. J. Fraser showed a series of hybrid mints and their varieties, comparing his specimens with the published descriptions.

Variation in Eucalyptus citriodora.—Mr. Worsley showed leaves of *Eucalyptus citriodora* from seedlings, some of which were of the common citriodora type, with glandular leaves and a cup-shaped base to the blade, the other with almost glabrous leaves, little odour, and almost without the cup-shaped base to the blade. These two forms had appeared upon seedlings, but he had now found both on one plant.

Momordica cochinchinensis.—Fruit of this plant, the seeds of which contain a very quick-drying oil, were sent from Kew.

Cypripedium insigne 'Oddity'.—Mr. C. J. Lucas sent a specimen of this curious form, which constantly produces flowers with three labella, two petals having become lip-like.

Plants in flower.—To illustrate the recent mild weather, Mr. Marsden Jones sent a list of sixty-one native plants which he had seen in flower at the end of November.

SCIENTIFIC COMMITTEE, DECEMBER 14, 1920.

Mr. E. A. BOWLES, M.A., in the Chair, and six members present.

Variation in Pyrus Aria.—Mr. J. Fraser showed specimens of forms of *Pyrus Aria* which he had collected from various wild localities—one near *P. salicifolia* from Farthing Downs, Coulsdon, and *P. intermedia*, A. Ley, from Breconshire.

The late Mr. Spencer Pickering.—A vote of condolence with the relatives of our late member, Mr. S. U. Pickering, was unanimously passed.

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 13, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mrs. Leveson-Gower, Wokingham, for fruit.
To Messrs. Sutton, Reading, for winter vegetables.

Silver Banksian Medal.

To Col. W. Davies, Slough, for fruit.
To F. M. Vokes, Esq., Southampton, for fruit.

The following awards recommended by the Sub-Committee to Garden Swedes on trial at Wisley were confirmed.

Award of Merit.

No. 8. 'Superlative Garden Swede,' from Messrs. Barr.
No. 10. 'Yellow Garden Swede,' from Mr. A. Dawkins.
No. 14. 'Nayler's Ruta Baga,' from Messrs. Thorburn, New York.
No. 20. 'Acme,' from Messrs. Gartons, Warrington.
No. 22. 'Nonsuch Purple Top,' from Messrs. Watkins & Simpson.

Highly Commended.

No. 18. 'Abundance,' from Messrs. Alex. Dickson, Belfast.
No. 24. 'Eclipse Purple Top,' from Messrs. Dickson & Robinson.

Commended.

No. 12. 'Premier,' from Messrs. Dickson & Robinson.

Other Exhibits :—

Mr. R. Bullock, Slough : Apples.
Messrs. Bunyard, Maidstone : Apples.
Mr. C. W. Clarke, West Hagley : Apple 'Clarke's Seedling.'
Miss Horrocks, Bordon : Apple 'Lord Haig.'
Mr. W. Jarvis, Deddington : Apple 'Xmas Pippin.'
Mrs. Miller, Marlow : preserves.
R.H.S. Gardens, Wisley : Apple 'Christie Manson.'
Mrs. Wallace, Ware : Apple 'Lord Allenby.'
Messrs. Westmacott, London : South African preserves.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 27, 1920.

Mr. C. G. A. NIX in the Chair, and fifteen members present.

Awards Recommended :—

Silver Hogg Medal.

To C. A. Cain, Esq., Welwyn, for Apples.

Silver Knightian Medal.

To J. B. Fortescue, Esq., Maidenhead, for Apples.

Silver Banksian Medal.

To H. L. Robson, Esq., Guildford, for Apples.

Other Exhibits :—

Messrs. Colwill, Sidmouth : Apple 'Earl Haig.'
Mr. Guile, Newport : Apple 'Belmont Pippin.'
Mrs. Miller, Marlow : preserves.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 10, 1920.

Mr. C. G. A. NIX in the Chair, and fifteen members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To the Government of the Union of South Africa, for South African fruits.

Silver Knightian Medal.

To Messrs. Sutton, Reading, for hardy winter vegetables.

Silver Banksian Medal.

Mr. Gardner, Claygate, for fruit.

Other Exhibits :—

Mr. T. Giles, Salisbury : stewing Pears.

Mr. G. Gurney, Newbury : Apple 'Newbury Seedling.'

Mr. Jordan, Lingfield : Onion 'Autumn Triumph.'

Mr. Kettle, Corfe Mullen : seeding Apple 'Lloyd George.'

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 24, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and sixteen members present.

Award Recommended :—

Silver Knightian Medal.

To Sir M. Turner, Havering, for fruit.

Other Exhibits :—

Mr. Charrington, Limpsfield : Apple 'Limpsfield Seedling.'

Mrs. Culpeper-Clayton, Watton : Apple 'Dr. Harvey.'

Mr. Horsland, Tewkesbury : Apples.

Messrs. Laxton, Bedford : Apple 'Laxton's Superb.'

Lady Ludlow, Luton Hoo : Pear 'Catillac.'

Mrs. Miller, Marlow : preserves.

FRUIT AND VEGETABLE COMMITTEE, MARCH 9, 1920.

Mr. C. G. A. NIX in the Chair, and twenty-four members present.

Awards Recommended :—

Gold Medal.

To Messrs. Bunyard, Maidstone, for Apples.

Silver-gilt Knightian Medal.

To C. A. Cain, Esq., Welwyn, for Apples.

Silver Hogg Medal.

To Messrs. Rivers, Sawbridgeworth, for Citrons.

Silver Knightian Medal.

To Messrs. Cheal, Crawley, for Apples.

To Messrs. Sutton, Reading, for vegetables.

Silver Banksian Medal.

To Col. Biddulph, for Apple 'Cox's Orange Pippin.'

To Lady Drummond, Warwick, for Apples.

To Mrs. Pulman, Bisley, for Apples.

Bronze Grenfell Medal.

To Miss Holland, Uppingham, for Apple 'Bess Pool.'

Award of Merit.

To Apple 'Alfriston' (votes 9 for), from Mr. W. Crump, V.M.H., Malvern Link. This variety is an old one, raised by Mr. Shepherd at Uckfield, Sussex. The tree is a strong grower and on some soils a fruitful sort. Fruit very large, usually quite green, but occasionally flushed on the sunny side. Now so well known as scarcely to need a description.

Other Exhibits :—

Messrs. Chivers, Cambridge : Apple 'Cropper.'
Mr. Grace, Finchley : Apples.
Mr. G. W. Miller, Wisbech : Rhubarb.
Mr. C. W. Parker, Faulkbourne : Apples.
South African Fruit Company, London : fruit.
Messrs. Veitch, Exeter : Apples 'D'Arcy Spice' and 'Newton Pippin.'
Mr. A. G. Villas, Taunton : Apples.

FRUIT AND VEGETABLE COMMITTEE, MARCH 23, 1920.

Mr. C. G. A. NIX in the Chair, and twelve members present.

Award Recommended :—

Silver Banksian Medal.

To Mr. F. Streeter, Straffan, for Apples.

Other Exhibits :—

Mr. C. A. Bayford, Malvern : Apples.
Mr. G. W. Miller, Wisbech : Rhubarb.

FRUIT AND VEGETABLE COMMITTEE, APRIL 13, 1920.

Mr. A. H. PEARSON in the Chair, and fifteen members present.

Award Recommended :—

Silver Knightian Medal.

To Messrs. Sutton, Reading, for vegetables.

The awards recommended to Dwarf Beans for forcing at Wisley by the Sub-Committee were confirmed.

Other Exhibits :—

Mr. E. Hills, Worcester : Apple 'The Rhydd Seedling.'
Mr. G. Pyne, Topsham : Apple 'Orotava.'

FRUIT AND VEGETABLE COMMITTEE, APRIL 27, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and nineteen members present.

Award Recommended :—

Silver Banksian Medal.

To Messrs. Sutton, Reading, for vegetables.

FRUIT AND VEGETABLE COMMITTEE, MAY 11, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and fifteen members present.

Award Recommended :—

Silver Banksian Medal.

To Sir Montagu Turner, Havering, for late keeping Apples.

FRUIT AND VEGETABLE COMMITTEE, JUNE 1, 1920, at Chelsea.

Mr. C. G. A. NIX in the Chair, and nineteen members present.

The following awards recommended to Round-Seeded Spinach at Wisley by the Sub-Committee were confirmed:

First-class Certificate.

No. 27, 'Triumph Improved,' sent by Messrs. Barr.

Award of Merit.

No. 6, 'Victoria,' sent by Messrs. Cooper Taber.

No. 23, 'Long Standing Round,' sent by Messrs. Sutton.

Highly Commended.

No. 30, 'The Carter,' sent by Messrs. Carter.

Commended.

No. 12, 'Viroflay,' sent by Messrs. R. Veitch.

No. 18, 'Common Round or Summer,' sent by Messrs. Barr.

Exhibits :—

Mr. N. H. Gabb, Worcester : Apple 'Sandlin Duchess.'

V. W. Yorke, Esq., Tewkesbury : branches of blossom of Apple 'Reliable.'

FRUIT AND VEGETABLE COMMITTEE, JUNE 15, 1920.

Mr. W. POUPART in the Chair, and twelve members present.

The awards recommended to First Early Peas at Wisley by the Sub-Committee were confirmed (see p. 382).

Exhibits :—

W. F. M. Copeland, Esq., Southampton : Apple 'Duke of Beaufort' and Apple 'Chateley's Kernel.'

Mr. P. H. Cousens, Swanwick : Strawberry 'The Duke.'

Mrs. Leveson-Gower, Wokingham : Apples.

R.H.S. Gardens, Wisley : Peas.

Messrs. Whitelegg, Chislehurst : Strawberries 'Hatfield Victor' and 'Hatfield Premier.'

V. W. Yorke, Esq., Tewkesbury : Apple 'Reliable.'

FRUIT AND VEGETABLE COMMITTEE, JUNE 29, 1920.

Mr. E. A. BUNYARD in the Chair, and eleven members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Whitelegg, Chislehurst, for Red Currants and Strawberries.

The awards recommended to Second Early Peas at Wisley by the Sub-Committee were confirmed (see p. 382).

Other Exhibits :—

Mr. J. J. Kettle, Corfe Mullen : Raspberries.

Messrs. Laxton, Bedford : Strawberry 'Laxtonian.'

R.H.S. Gardens, Wisley : Peas.

FRUIT AND VEGETABLE COMMITTEE, JULY 13, 1920.

Mr. C. G. A. NIX in the Chair, and fifteen members present.

No awards were recommended on this occasion.

Exhibits.

Mr. J. J. Kettle, Corfe Mullen : Raspberries.

C. E. Powell, Esq., Binfield : Raspberry ' Binfield Seedling.'

FRUIT AND VEGETABLE COMMITTEE, JULY 27, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and fourteen members present.

Awards Recommended :—

Gold Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for vegetables.

Award of Merit.

Subject to naming and confirmation after trial at Wisley an *Award of Merit* was proposed (votes 12 for, 1 against) to an unnamed Melon from Mr. A. Perry, Tendring Hall Gardens, Colchester.

Other Exhibits.

Mr. J. C. Allgrove, Langley : Apple ' Delicious ' and Apple ' Ontario.'

Messrs. Ryder, St. Albans : Broad Bean ' Multiple.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 10, 1920.

Mr. OWEN THOMAS, V.M.H., in the Chair, and five members present.

No awards were recommended on this occasion.

Exhibit.

Mr. J. M. Fleming, Hadlow : seedling Runner Bean.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 24, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and thirteen members present.

Awards Recommended :—

Gold Medal.

To J. A. Nix, Esq. (gr. Mr. Neal), Crawley, for a collection of fruit.

Silver Knightian Medal.

To Messrs. Spooner, Hounslow, for fruit.

Award of Merit.

To Apple ' Laxton's Peerless ' (votes unanimous), from Messrs. Laxton, Bedford. Fruit of large size, deep round, handsome even outline ; eye closed, set in a shallow basin ; stalk one inch long, thin, set in a small cavity ; skin green, dotted with brown spots on the exposed side, and suffused with a faint brown tinge. Flesh very firm, crisp, acid, and excellent for cooking. Trees in the Society's Gardens at Wisley have cropped well for four years successively. Tree is a moderate sturdy grower.

To Apple ' The Premier ' (votes unanimous), from Messrs. Laxton, Bedford. Fruit of medium size, roundish conical ; eye closed ; stalk short, stem about one inch long, not very deeply inserted ; skin highly coloured and rather greasy ; flesh whitish, firm, crisp, juicy, richly flavoured. A promising dessert variety, said to be a free bearer and combining the good qualities of both parents, viz. ' Mr. Gladstone ' x ' Worcester Pearmain.'

To Melon 'Victory' (votes 10 for, 3 against), from Mr. W. Earp, Bayham Abbey Gardens, Lamberhurst, Kent. Fruit very large, globular in form, brownish-white in colour, heavily netted. Flesh scarlet, very deep, with a small seed cavity, melting and very juicy, and rich pleasing flavour. Raised from Earp's Seedling ♀ × Sutton's Seedling ♂. The plant is stated to be a moderate grower, free setter, and good bearer.

Other Exhibits.

Messrs. H. Chapman, Rye : Tomato 'Rotherside.'
Miss E. Grigsby, West Drayton : variegated Cucumbers.
Messrs. Ryder, St. Albans : Bean 'Rajah.'

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 7, 1920.

Mr. C. G. A. NIX in the Chair, and eleven members present.

Awards Recommended :—

Gold Medal.

To Messrs. Rivers, Sawbridgeworth, for fruit trees in pots.

Silver Banksian Medal.

To the Leigh-on-Sea Vacant Land Cultivation Society (Sec., Mr. J. Salsbury), for vegetables.

To Messrs. Whitelegg, Chislehurst, for fruit.

Cultural Commendation.

To Messrs. H. Chapman, Rye, for Apple 'St. Everard.'

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 21, 1920.

Mr. C. G. A. NIX in the Chair, and fifteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for vegetables.

To Messrs. Sutton, Reading, for Onions.

Silver Knightian Medal.

To Messrs. Whitelegg, Chislehurst, for fruit.

Other Exhibits.

Messrs. Bunyard, Maidstone : Strawberry 'St. Fiacre.'
Mr. H. Johnson, Putney : Cucumber 'Favourite.'
Mr. F. Sage, Impington : Cucumber 'Histonian.'

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 5, 1920.

BRITISH FRUIT SHOW.

Mr. J. CHEAL, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Gold Medal.

To C. A. Cain, Esq., Welwyn, for fruit.

To Kepper Vinery Co., Kepper, for Grapes.

Silver-gilt Knightian Medal.

To Sir William Cain, Walgrave on Thames, for fruit.

To Mr. H. L. Robson, Guildford, for Apples.

Silver Banksian Medal.

To Mrs. Sauer, Bourne End, for Apple 'Rev. W. Wilks.'

Award of Merit.

To Apple 'Herring's Seedling' (votes unanimous), from Messrs. J. R. Pearson, Lowdham. An excellent dessert variety of large size. Its colour is red, and it has a short stalk and a deep open eye with reflexed segments. The tree is upright in growth, and a heavy cropper.

To Apple 'Histon Cropper' (votes unanimous), from Messrs. Chivers, Histon. A large conical apple with a closed eye and a short stalk. Its skin is green flushed with red, and spotted.

To Apple 'Tythby Seedling' (votes unanimous), from Messrs. Chivers, Histon. This apple was granted a provisional Award on November 18, 1919, and the award is now confirmed after inspection of growing trees by a deputation from the Committee.

The awards recommended to Second Early Potatoes at Wisley by the Subcommittee were confirmed (see p. 390).

Other Exhibits.

Mr. F. Ashman, Wokingham: Apple 'Ashman's Seedling.'

Mr. T. P. Edwards, Southgate: Apple 'Northern Height.'

Mr. G. T. Good, Bushey: Apple 'Good's Bushey Grove.'

Messrs. Laxton, Bedford: Apples.

Mr. W. Mason, Cirencester: Potato 'The Victory.'

Mr. E. Parsons, Worcester: Apple 'Queen Mary.'

Messrs. Seabrook, Chelmsford: Apple 'Excelsa.'

Mr. R. Staward, Hertford: seedling Apple.

Mr. C. Turner, Slough: shallot and onion cross.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 19, 1920.

Mr. C. G. A. NIX in the Chair, and twelve members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To F. C. Stoop, Esq. (gr. Mr. G. Carpenter), Byfleet, for Apples.

To Messrs. Sutton, Reading, for Cabbages.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for vegetables.

Cultural Commendation.

To R.H.S. Gardens, Wisley, for Potatoes.

Other Exhibits.

Messrs. House, Westbury-on-Trym: Raspberry 'Heytor.'

Messrs. Laxton, Bedford: Apple 'Laxton's Ideal.'

Mr. E. J. Vinten, Canterbury: seedling Apple.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 2, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Gold Medal.

To Messrs. Barr, Taplow, for vegetables.

Silver Banksian Medal.

To W. Maurice Gay, Esq., Sion, for Apple 'Belle de Boskoop.'

Other Exhibits.

Messrs. Brown, Peterborough: Apple 'Ketton Beauty.'

Mr. H. Jones, Letchworth: Apple 'Sunrise.'

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 16, 1920.

Mr. C. G. A. Nix in the Chair, and twelve members present.

Awards Recommended :—

Silver Knightian Medal.

To Messrs. Bees, Liverpool, for Potatos.

Silver Banksian Medal.

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for Capsicums.

Other Exhibits.

Mr. J. Fielder, Southampton : Apple 'Fielder's Ruby.'

Ministry of Agriculture, London : Potatos.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 30, 1920.

Mr. C. G. A. NIX in the Chair, and twelve members present.

Awards Recommended :—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Potatos.

Other Exhibits.

Mrs. Barwell, Billingshurst : fruit.

Mrs. Miller, Marlow : preserves.

Miss Sewell, S. Kensington : preserves.

Mr. W. Tayler, Godalming : Apple 'Joybells.'

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 14, 1920.

Mr. J. CHEAL, V.M.H., in the Chair, and eleven members present.

Award Recommended :—

Silver-gilt Banksian Medal.

To Sir Montagu Turner, Romford, for fruit.

Other Exhibits.

Mrs. Miller, Marlow : 'Moyleen' Crataegus jelly.

Miss Sewell, S. Kensington : 'Elmhurst' preserves.

FLORAL COMMITTEE.

JANUARY 13, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To C. A. Cain, Esq., Welwyn, for Euphorbias.

Silver Flora Medal.

To Lord Lambourne, C.V.O., Romford, for Carnations.

To Mr. L. R. Russell, Richmond, for Azaleas.

To Messrs. Whitelegg, Chislehurst, for dwarf Conifers and alpinas.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Bronze Flora Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

To Messrs. Luxford, Harlow, for Chrysanthemums.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

Bronze Banksian Medal.

To Messrs. Gill, Falmouth, for Rhododendrons.

To Messrs. S. Low, Bush Hill Park, for Carnations and Azaleas.

Award of Merit.

To Chrysanthemum 'The Favourite' (votes unanimous), from Messrs. Godfrey, Exmouth. A pure white Decorative variety of good form and medium size.

Other Exhibits :—

Messrs. H. Chapman, Rye : *Tulipa Kaufmanniana* var. *ryensis*.

Misses Hopkins, Shepperton : hardy plants.

Messrs. Sander, St. Albans : Azalea 'Fred. Sander.'

Sir Philip H. Waterlow, Bt., Wrotham : Begonia 'Lady Waterlow.'

FLORAL COMMITTEE, JANUARY 27, 1920.

Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Sutton, Reading, for Primulas.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Mr. L. R. Russell, Richmond, for Azaleas.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and hardy plants.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Messrs. Low, Bush Hill Park, for Carnations and Azaleas.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Mr. G. W. Miller, Wisbech, for hardy plants.

To Messrs. Tucker, Oxford, for alpinas.

Bronze Flora Medal.

To Messrs. Gill, Falmouth, for Rhododendrons.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

To Mr. G. Reuthe, Keston, for hardy plants.

Other Exhibits :—

Messrs. Barr, Taplow : alpine.
 Capt. M. Drummond, Southampton : Chrysanthemum 'Nancy Perkins.'
 Messrs. C. Elliott, Stevenage : alpine.
 Misses Hopkins, Shepperton : hardy plants.
 Mr. F. C. Stern, Goring-by-Sea : *Saxifraga Burseriana Gloria lutea*.
 Messrs. Waterer, Sons & Crisp, Twyford : hardy plants.

FLORAL COMMITTEE, FEBRUARY 10, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
 To Mr. L. R. Russell, Richmond, for Azaleas.

Silver Grenfell Medal.

To Messrs. Whitelegg, Chislehurst, for alpine.

Silver Banksian Medal.

To Mr. C. Engelmann, Saffron Walden, for Carnations.
 To Messrs. May, Upper Edmonton, for ferns and flowering plants.
 To Messrs. Tucker, Oxford, for alpine.

Bronze Flora Medal.

To Messrs. Barr, Taplow, for alpine and Cyclamen.
 To Messrs. Cutbush, Highgate, for Carnations and hardy plants.
 To Messrs. Low, Bush Hill Park, for Carnations.
 To Mr. G. W. Miller, Wisbech, for hardy plants.
 To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To Misses Allen-Brown, Henfield, for Violets.
 To Mr. J. J. Kettle, Corfe Mullen, for Violets.

Award of Merit.

To *Galanthus nivalis*, Atkins' variety (votes 17 for, 1 against), from Rev. W. Wilks, M.A., V.M.H., Shirley, Croydon. A tall growing Snowdrop with a beautiful long bud and large light-green spots. It is one of the earliest varieties to flower.

Cultural Commendation.

To W. R. Dykes, Esq., M.A., Godalming, for seedlings of *Iris Rosenbachiana*.

Other Exhibits :—

Mr. G. W. Blathwayt, Porlock : various plants grown in the open.
 Messrs. Bunyard, Maidstone : alpine.
 Messrs. Cheal, Crawley : alpine.
 Mr. R. Prichard, West Moors : alpine.

FLORAL COMMITTEE, FEBRUARY 24, 1920.

H. B. MAY, Esq., V.M.H., in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To C. A. Cain, Esq., Welwyn, for Begonias and Cyclamen.

Silver Flora Medal.

To Messrs. Gill, Falmouth, for Rhododendrons.

Silver Grenfell Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Mr. G. W. Miller, Wisbech, for hardy plants.

To Mr. L. R. Russell, Richmond, for Azaleas.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and forced shrubs.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

To Messrs. Low, Bush Hill Park, for Carnations and Cyclamen.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Mr. G. Reuthe, Keston, for hardy plants.

To Messrs. Tucker, Oxford, for alpinines.

To Messrs. Waterer, Sons & Crisp, Twyford, for alpinines.

To Messrs. Whitelegg, Chislehurst, for alpinines.

Bronze Flora Medal.

Messrs. Blackmore & Langdon, Bath, for Violets and Primroses.

Messrs. Bowell & Skarratt, Cheltenham, for alpinines.

Cultural Commendation.

To Messrs. Whitelegg, Chislehurst, for strain of *Helleborus orientalis* hybrids.

Other Exhibits :—

Mrs. Backhouse, Hereford : Snowdrops and Scillas.

Mr. G. W. W. Blathwayt, Porlock : shrubs from the open.

Misses Hopkins, Shepperton : hardy plants.

S. Morris, Esq., Norwich : *Hymenanthera crassifolia*, F.C.C. 1892.

Messrs. Piper, Langley : hardy plants.

J. B. Stevenson, Esq., Ascot : *Rhododendron Berkleyi*.

G. M. Vereker, Esq., Salcombe : *Magnolia Campbellii*, F.C.C. 1903.

FLORAL COMMITTEE, MARCH 9, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and thirty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

Silver Flora Medal.

To Messrs. Cuthbert, Southgate, for Azaleas.

To Messrs. Whitelegg, Chislehurst, for hardy plants.

Silver Grenfell Medal.

To Messrs. Cutbush, Highgate, for forced shrubs.

To Mr. G. W. Miller, Wisbech, for hardy plants.

To Messrs. Piper, Langley, for rock garden.

Silver Banksian Medal.

To C. A. Cain, Esq., Welwyn, for Carnations.

To Mr. E. J. Hicks, Twyford, for Roses.

To Messrs. Low, Bush Hill Park, for Carnations.

To Messrs. Hay, Upper Edmonton, for ferns and flowering plants.

Bronze Banksian Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

To Messrs. Luxford, Harlow, for Carnations.

To Mr. G. Reuthe, Keston, for hardy plants.

To Mr. L. R. Russell, Richmond, for forced shrubs.

To Messrs. Tucker, Oxford, for alpinines.

Award of Merit.

To *Freesia* 'Quakeress' (votes 20 for, 1 against), from Rev. J. Jacob, Whitechurch, Salop. A large-flowered *Freesia* of a pale lilac-mauve shade with a pale cream blotch.

To *Freesia* 'Rosebud' (votes 18 for, 1 against), from Rev. J. Jacob, Whitechurch, Salop. The flowers of this variety are large and open, whitish inside, and tipped and streaked with rose pink.

To *Helleborus* 'Ena' (votes 15 for, 6 against), from Adeline, Duchess of Bedford, Chenies. This fine dark maroon variety and the one referred to below were selected from a good strain of *Helleborus punctatus* hybrids.

To *Helleborus* 'Gertie' (votes 15 for, 4 against), from Adeline, Duchess of Bedford, Chenies. This variety is of similar form to the above, but of a light claret colour and prettily spotted.

To *Primula denticulata magnifica* (strain) (votes 16 for), from Messrs. Baker, Wolverhampton. A particularly vigorous and large-flowered strain of this well-known *Primula*. The colours vary from white through various shades of lavender and mauve, to rosy lilac.

To *Rhododendron calophytum* (votes unanimous), from Mr. G. Reuthe, Keston. A Chinese species of great beauty. The large, open, bell-shaped flowers are white, heavily flushed with pink, with a deep crimson blotch at the base. They are borne on reddish pedicels about three inches long in trusses of about twenty blooms. The long lanceolate leaves are dark green.

Botanical Certificate.

To *Androsace longifolia* (votes unanimous), from S. Morris, Esq., Norwich.

Other Exhibits :—

Messrs. Artingdale, Sheffield : *Primulas*.

Messrs. Chapman, Rye : *Freesia* 'Moonlight.'

Messrs. Cheal, Crawley : shrubs.

Misses Hopkins, Shepperton : hardy plants.

Mr. R. A. Malby, London : *Sempervivum rubicundum* × *S. Comollii*.

Mr. G. Prince, Longworth : Roses.

Mr. Stevens, Farnham : *Chionodoxas*.

Mrs. Tuke, Chiswick : *Camellias*.

FLORAL COMMITTEE, MARCH 23, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and thirty members present.

Awards Recommended :—*Gold Medal.*

To Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree, for alpinists.

Silver-gilt Banksian Medal.

To Messrs. Whitelegg, Chislehurst, for rock garden.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for Azaleas and Magnolias.

To Messrs. Gill, Falmouth, for *Rhododendrons*.

To Mr. G. W. Miller, Wisbech, for hardy plants and Azaleas.

To Mr. L. R. Russell, Richmond, for Azaleas and stove plants.

Silver Grenfell Medal.

To Mr. G. H. Dalrymple, Southampton, for *Freesias*.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Baker, Wolverhampton, for hardy plants.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

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To Mr. E. J. Hicks, Twyford, for Roses.
To Messrs. S. Low, Bush Hill Park, for Carnations.
To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Flora Medal.

To Messrs. Piper, Langley, for terrace garden.
To Messrs. Tucker, Oxford, for alpinas.

Bronze Banksian Medal.

To Messrs. Bowell & Skarratt, Cheltenham, for alpinas.

Award of Merit.

To *Clematis Meyeniana* (votes unanimous), from Capt. B. H. B. Symons-Jeune, Henley-on-Thames. A handsome sub-alpine, evergreen species raised from seed collected in Western China, by Mr. E. H. Wilson. The foliage is more pointed than that of *C. Armandii*, and the white flowers are more star-shaped through borne in similar axillary clusters. The plant is hardy and very vigorous, making 10 to 12 foot growths in a season. It is as free-flowering and vigorous as *C. montana*, and the blooms are very sweetly scented.

To *Freesia 'Golden King'* (votes 19 for, 1 against), from Mr. G. H. Dalrymple, Southampton. The flowers of this variety are of a deep golden-apricot colour, very sweetly scented and of large size.

To *Freesia 'Robinetta'* (votes 18 for, 2 against), from Mr. G. H. Dalrymple, Southampton. A deep rose-pink variety blotched with gold and very fragrant.

To *Freesia 'Yellow Prince'* (votes 21 for), from Mr. G. H. Dalrymple, Southampton. A deep golden-yellow variety blotched with orange. The flowers are very large in size and have a very pleasing perfume.

To *Iris bucharica aurea* (votes 21 for), from W. R. Dykes, Esq., M.A., London. This is a very interesting hybrid raised between *I. bucharica* and *I. orchoides*. The flowers are of a bright clear yellow colour.

Other Exhibits :—

Mrs. Berkeley, Spetchley, Worcester : Polyanthus 'Spetchley Strain.'

Mr. H. S. J. Canttug, Leyton : Auricula 'Glory of Leyton.'

Messrs. H. Chapman, Rye : *Freesia 'Radiance.'*

Messrs. Cheal, Crawley : alpinas, shrubs, &c.

Misses Hopkins, Shepperton : hardy plants.

Mr. J. J. Kettle, Corfe Mullen : Violets.

Mr. P. Rosenheim, East Molesey : Primulas.

FLORAL COMMITTEE, APRIL 13, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Gold Medal.

To T. H. Lowinsky, Esq. (gr. Mr. Dibble), Sunninghill, for Rhododendrons.

Silver Floral Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Cuthbert, Southgate, for Azaleas &c.

To Messrs. Cheal, Crawley, for flowering shrubs.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Silver Grentell Medal.

To Mr. J. Douglas, Great Bookham, for Auriculas.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Hon. Vicary Gibbs (gr. Mr. Beckett), Elstree, for Gardenias.

To Messrs. Gill, Falmouth, for Rhododendrons.

To Mr. L. R. Russell, Richmond, for Azaleas.

Silver Banksian Medal.

- To Viscount Astor (gr. Mr. Camm), Taplow, for *Celsia cretica* 'Cliveden var.'
 To Messrs. Cutbush, Barnet, for Roses.
 To Mr. E. J. Hicks, Twyford, for Roses.
 To Messrs. Low, Bush Hill Park, for Carnations and green-house plants.
 To Messrs. May, Upper Edmonton, for ferns and flowering plants.
 To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Floral Medal.

- To Messrs. Bowell & Skarratt, Cheltenham, for hardy plants.
 To Messrs. Reamsbottom, Geashill, for Anemones.
 To Mr. J. Sweet, Whetstone, for *Cytisus racemosus* 'Sweet's Double.'
 To Messrs. Tucker, Oxford, for alpinas.

Bronze Banksian Medal.

- To Misses Hopkins, Shepperton, for hardy plants.

Cultural Commendation.

- To Viscount Astor, Taplow, for *Celsia cretica* 'Cliveden var.'
 To Messrs. Gill, Falmouth, for *Rhododendron Nuttallii*, **F.C.C.** 1864.

First-class Certificate.

To *Cornus Nuttallii* (votes unanimous), from J. Osborne, Esq. (gr. Mr. W. A. Cook), Weybridge. This beautiful tree or shrub from the Pacific coast of North America is very rarely seen in flower in this country. The leaves are obovate and from 2 to 4 inches long. The involucre measures about 4 inches across, and consists of usually four to six obovate, whitish bracts, which are the chief beauty of the plant.

Award of Merit.

To *Auricula* 'Bookham Blue' (votes unanimous), from Mr. J. Douglas, Great Bookham. A very free-flowering and vigorous alpine variety with big trusses of large deep-blue flowers.

To *Cardamine pratensis lilacina plena* (votes 16 for, 2 against), from Messrs. Ladhams, Southampton. A good semi-double form of this well-known native plant with lilac flowers.

To Carnation 'Wivelsfield Claret' (votes 15 for, 2 against), from Messrs. Allwood, Haywards Heath. The flowers of this perpetual-flowering variety are large and full, and of a rich claret-red colour. The edges of the petals are serrated and crinkled. The calyces are non-bursting, and the flower has a very decided clove perfume.

To *Daphne Cneorum alba* (votes 8 for, 4 against), from Messrs. Tucker, Oxford. A pure white form of this fragrant-flowered dwarf shrub.

To *Bryanthus aleuticus* (votes 10 for), from Mr. G. Reuthe, Keston. A dwarf evergreen shrub belonging to the Ericaceae and sometimes called *Phyllodoce*. The flowers are cream-coloured and bell-shaped, like those of *Andromeda*.

To *Bryanthus nipponicus* (votes unanimous), from Mr. G. Reuthe, Keston. This is similar in habit to *B. aleuticus*, but its flowers are white and very abundant. The plant is a native of the mountainous regions of Japan.

To *Primula marginata* var. 'Linda Pope' (votes 15 for), from Dr. J. Macwatt, Dun. A very fine variety bearing trusses of lilac-mauve flowers nearly one inch across with a white eye. Most of the trusses have about eight flowers. The calyces are mealy, and the leaves are large and much cut at the edge.

To *Rhododendron* 'Don Ernesto' (votes 10 for), from T. H. Lowinsky, Esq. (gr. Mr. G. Dibble), Sunninghill. A rich rosy scarlet variety of great beauty and fine form. It and the other three *Rhododendrons* from the same exhibitor are hybrids resulting from crosses between *R. 'Doncaster'* and *R. Aucklandi*.

To *Rhododendron* 'Donna Anita' (votes 12 for), from T. H. Lowinsky, Esq., Sunninghill. The flowers of this variety are of a beautiful shell-pink colour.

To *Rhododendron* 'Donna Florenza' (votes 9 for, 5 against), from T. H. Lowinsky, Esq., Sunninghill. A handsome variety with deep rich rose flowers.

To *Rhododendron* 'Richard Gill' (votes unanimous), from Messrs. Gill, Falmouth. This is the result of a cross between *R. Thomsoni* and *R. Fortunei*. The flowers are large, borne in a big truss, and are of a beautiful deep rose colour.

To *Rhododendron* 'The Don' (votes unanimous), from T. H. Lowinsky, Esq., Sunninghill. The flowers of this variety are of an intense rosy-scarlet shade.

Other Exhibits :—

Miss Benson, High Wycombe : Polyanthus 'Greenways Glow.'
 Messrs. Buffard & Patrick, Ditchling : *Primula obconica*.
 Messrs. Bunyard, Maidstone : Irises.
 W. R. Dykes, Esq., London : *Fritillaria pallidiflora*, F.C.C. 1887.
 C. Eley, Esq., East Bergholt : *Pyrus Eleyi*.
 Messrs. C. Elliott, Stevenage : rock plants.
 Miss Jekyll, Godalming : hybrid *Euphorbias*.
 E. J. P. Magor, Esq., St. Tudy : Rhododendrons.
 Messrs. Piper, Langley : alpinas.
 Capt. Symons-Jeune, Henley-on-Thames : Saxifrages.

FLORAL COMMITTEE, APRIL 27, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-nine members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Barnet, for Roses and hardy plants.

Silver Flora Medal.

To Messrs. Luxford, Harlow, for Carnations.

To Messrs. Wallace, Colchester, for shrubs and alpinas.

Silver Grenfell Medal.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Mr. G. Reuthe, Keston, for hardy plants.

To Mr. L. R. Russell, Richmond, for flowering, foliage, and stove plants.

To M. Yorke, Esq., Iver Heath, for Heaths and Trilliums.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for shrubs.

To Messrs. Low, Bush Hill Park, for Carnations and greenhouse plants.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Mr. G. W. Miller, Wisbech, for hardy plants.

To Messrs. Tucker, Oxford, for alpinas.

Bronze Flora Medal.

To Messrs. Piper, Langley, for hardy plants.

To Mr. R. Prichard, West Moors, for alpinas.

To Messrs. Waterer, Sons & Crisp, Twyford, for alpinas.

Bronze Banksian Medal.

To Messrs. Baker, Wolverhampton, for hardy plants.

To Messrs. Bowell & Skarratt, Cheltenham, for alpinas.

To Messrs. Carter Page, London, for Violas.

To Messrs. Peed, Norwood, for Azaleas.

To Messrs. Reamsbottom, Geashill, for Anemones.

To Mr. C. van Tubergen, Haarlem, for Freesias.

Award of Merit.

To Anemone 'St. Bavo' strain (votes unanimous), from Mr. C. van Tubergen, Haarlem, Holland. A very pretty strain of *Anemone fulgens*, including the following colours : rose, scarlet, red, pink, rosy-lilac, salmon, and magenta.

To Carnation 'Renown' (votes unanimous), from Messrs. Cutbush, Barnet. A pale pink perpetual-flowering variety of nice form and with a pleasing scent.

To Freesia 'Apogée' (votes unanimous), from Mr. C. van Tubergen, Haarlem. A very large-flowered variety, pale yellow in colour, blotched with gold and very sweetly scented.

To *Iris lutescens* 'Yellow-hammer' (votes 18 for), from W. R. Dykes, Esq., London. A very pretty free-flowering seedling of *Iris lutescens*. The flowers are yellow marked with greenish brown on the falls and the beard is golden. The plant is of good height, and is the first of the tall yellows to open.

Other Exhibits :—

Col. Stephenson Clarke, Cuckfield : Chinese Meconopsis.
 Rev. P. Clementi-Smith, London : Billbergia.
 Messrs. C. Elliott, Stevenage : alpinas.
 A. D. Gardner, Esq., Newmarket : *Rosa gigantea*.
 Dame Alice Godman, Horsham : Chinese Primulas.
 Misses Hopkins, Shepperton : hardy plants.
 T. Ickvingill, Esq., Keighley : Geranium 'Maude Duffill.'
 E. J. P. Magor, Esq., St. Tudy : Rhododendrons.
 M. Nicholls, Esq., Sevenoaks : Viola 'Betty.'
 A. O. Walker, Esq., Ulcombe : *Lunaria annua foliis variegatis*.

 FLORAL COMMITTEE, MAY 11, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-seven members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Messrs. Cuthbert, Southgate, for Azaleas.
 To Messrs. Wallace, Colchester, for Azaleas, Irises, &c.

Silver Flora Medal.

To Messrs. S. Low, Bush Hill Park, for Carnations.
 To Messrs. Waterer, Sons & Crisp, Twyford, for Rhododendrons and alpinas.

Silver Grenfell Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
 To Messrs. B. R. Cant, Colchester, for Roses.
 To Messrs. Cutbush, Barnet, for Roses, alpinas, &c.
 To Mr. C. Engelmann, Saffron Walden, for Carnations.
 To Messrs. Jackman, Woking, for Clematis.
 To Mrs. Lloyd Edwards, Ruabon, for Saxifrages, &c.
 To Mr. M. Prichard, Christchurch, for hardy plants.
 To Mr. C. Turner, Slough, for Lilacs.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for Azaleas.
 To Mr. E. J. Hicks, Twyford, for Roses.
 To Mr. A. Perry, Enfield, for hardy plants.
 To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Flora Medal.

To Messrs. Gill, Falmouth, for Rhododendrons.
 To Mr. G. W. Miller, Wisbech, for hardy plants.
 To Mr. L. R. Russell, Richmond, for Azaleas.

Bronze Grenfell Medal.

To Messrs. Carter Page, London, for Violas.
 To Messrs. Piper, Langley, for shrubs and alpinas.
 To Messrs. Reamsbottom, Geashill, for Anemones.

Bronze Banksian Medal.

To Mr. G. R. Downer, Chichester, for hardy plants.
 To Mr. C. A. Jardine, London, for hardy plants.
 To Messrs. May, Upper Edmonton, for ferns and flowering plants.
 To Mr. W. Wells, jun., Merstham, for hardy plants.

Award of Merit.

To Azalea 'Dr. Oosthoek' (votes 9 for, 1 against), from Messrs. Wallace, Colchester. A very free-flowering variety of the Mollis type with large, very bright orange-red flowers.

To Clivia 'St. Nicholas' (votes unanimous), from Hon. Robert James (gr. Mr. Benstead), Richmond, Yorks. A very fine seedling variety bearing a head of seven shortly stalked large orange-red flowers with golden-yellow base. The foliage is dark green, and the plant compact and dwarf in habit.

To *Myosotis dissitiflora* 'Roll of Honour' (votes unanimous), from Mrs. Lloyd Edwards, Ruabon. This is one of the largest and most beautiful Forget-me-nots yet raised. It is said to be a true perennial, and its beautiful clear opal-blue flowers are as large as a sixpenny piece.

To Pæony 'Souvenir du Professeur Cornu' (votes unanimous), from Mrs. Benson, Buckhurst. A very beautiful hybrid tree Pæony with large double yellow flowers stained with purplish-rose, which colour is very pronounced in the centre of the flower.

To Primula 'Aileen Aroon' (votes 16 for, 2 against), from Mr. M. Prichard, Christchurch. A very fine hybrid Primula resulting from a cross between *P. pulverulenta* and *P. Cockburniana*. It has the vigour and mealy stems of the former parent, and bears whorls of large fiery orange-red flowers on stout scapes one or two feet high. It is a very effective variety when seen in a mass.

To Saxifrage 'Monica' (votes 21 for, 3 against), from Mrs. Lloyd Edwards, Ruabon. A large-flowered variety of the Mossy section. The individual flowers are at least one inch across and are a deep rose-red in bud, but a paler Apple blossom pink when fully open.

Botanical Certificate.

To *Iris kashmiriana* 'Ranikhet' var. (votes unanimous), from Capt. R. Troup, Bridgwater. This Iris is the purple form of the white *I. kashmiriana*. It was collected at Kumaon, and has lavender-blue standards and purplish-blue falls edged with a lighter blue, and the beard is white.

Other Exhibits :—

W. Christy, Esq., Emsworth : *Aquilegia* 'Watergate Seedling.'

Messrs. C. Elliott, Stevenage : alpinas.

Misses Hopkins, Shepperton : hardy plants.

C. J. Lucas, Esq., Horsham : *Paulownia* 'Elwes' var.'

E. Marsden Jones, Esq., F.L.S., Malpas : *Cheiranthus* 'Mrs. Pershouse' and Geum 'Dolly North.'

Mr. M. Nicholls, Kemsing : *Viola* 'Betty.'

Miss E. Willmott, V.M.H., Great Warley : *Helwingia Willmottiae* and *H. japonica*.

M. F. Yorke, Esq., Iver Heath : *Rhododendron Edgarianum*.

FLORAL COMMITTEE, JUNE 1, 1920.

CHELSEA SHOW.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-three members present.

Awards Recommended :—

Award of Merit.

To Begonia 'Peace' (votes 9 for, 2 against), from Messrs. Blackmore & Langdon, Bath. A large double sulphury-white variety of great beauty and excellent form. The blooms measure about seven inches across.

To Carnation 'Lady Inverforth' (votes unanimous), from Messrs. S. Low, Bush Hill Park. A seedling Perpetual-flowering variety with strongly scented, salmon-pink flowers of excellent form.

To *Dianthus Allwoodii* 'Harold' (votes 8 for, 1 against), from Messrs. Allwood, Haywards Heath. This and the three succeeding varieties are selected from a new race of *Dianthus* which has been obtained as the result of nine years' inter-crossing and breeding between the Perpetual-flowering Carnation and various types of hardy garden Pinks. The race is very hardy and is perpetual-flowering. The variety under notice is a large pure white double with good calyx, and the flowers are borne in clusters on stems eighteen inches long.

To *Dianthus Allwoodii* 'Jean' (votes unanimous), from Messrs. Allwood, Haywards Heath. This variety has pure white double flowers with a deep violet-crimson centre.

To *Dianthus Allwoodii* 'Robert' (votes 8 for, 1 against), from Messrs. Allwood, Haywards Heath. A large old rose single variety with a light maroon centre.

To *Dianthus Allwoodii* 'Rufus' (votes 9 for), from Messrs. Allwood, Haywards Heath. A deep rose-pink double variety, with deep crimson markings at the base of the petals.

To Geum 'Lady Stratheden' (votes 9 for, 2 against), from Messrs. Baker, Codsall. A very free-flowering hardy plant about two feet high, bearing double golden-yellow flowers measuring two and a half inches across.

To Geum 'Orangeman' (votes 13 for, 1 against), from Messrs. Grove, Sutton Coldfield. This very free-flowering hardy plant resulted from a cross between *Geum Heldreichii* and *G. montanum aurantiacum*. The flowers are double, deep orange, and measure two and a half inches across. The height of the plant is two feet.

To Iris 'Ann Page' (votes 12 for), from Messrs. Wallace, Colchester. This handsome variety was raised by Sir Arthur Hort, Bt., and has very large pale lavender-blue flowers with a yellow beard. The falls, which are very broad, are lined with a brownish shade at the base.

To Iris 'Balaruc' (votes 6 for, 3 against), from W. R. Dykes, Esq., M.A., Godalming. This is a seedling of Iris 'Mrs. H. Darwin,' raised by M. F. Denis of Balaruc-les-Bains. The flowers are of medium size, white, with a few purplish markings at the base of the falls, and have a pale golden beard.

To Iris 'Prospero' (votes unanimous), from Messrs. Wallace, Colchester. This variety was raised by Mr. Yeld, and is of large size with pale lilac standards, violet-purple falls, and a golden beard.

To Iris *Xiphium* 'Voerman' (votes 13 for), from Messrs. Barr, Taplow. An early flowering 'Spanish' Iris with white flowers streaked with gold.

To *Lilium Farreri* (votes unanimous), from F. C. Stern, Esq., Goring-by-Sea. This beautiful lily of the Martagon section was raised from seeds collected in China. It grows from two and a half to three feet high, and bears pendulous white flowers prettily spotted with violet-blue at the base of the recurved segments. The anthers are orange and are borne on inch-long filaments. The leaves are lanceolate and measure about four inches long by half an inch broad.

To *Papaver orientale* 'Lord Lambourne' (votes 10 for, 4 against), from Mr. A. Perry, Enfield. A large-flowered, bright-scarlet variety with black blotches at the base of each segment. The edges of the petals are deeply fringed.

To *Picea Albertiana* (votes 9 for), from Messrs. Waterer, Sons & Crisp, Bagshot. A compact conical tree with pale-green acicular leaves about half an inch long.

To Pink 'Mrs. G. Walker' (votes unanimous), from Mr. C. H. Herbert, Birmingham. The flowers of this variety are double and of a rosy-pink colour with darker centre.

To Pink 'Victory' (votes unanimous), from Mr. C. H. Herbert, Birmingham. A double crimson-pink with clove scent.

To *Polystichum angulare divisilobum plumosum densum* No. 2 (votes 6 for, 2 against), from Mr. A. Perry, Enfield. A very graceful hardy fern of strong and robust habit, with long and broad fronds, having very finely divided plumose pinnae.

To *Polystichum angulare divisilobum robustum* (votes unanimous), from Mr. A. Perry, Enfield. A very beautiful hardy fern, having somewhat smaller fronds than the above, and having the pinnae set a little less closely together.

To *Roscoea Humeana* (votes unanimous), from Messrs. Bees, Chester. A very pretty Chinese species collected by Mr. George Forrest. The plant grows about six inches high and bears its hooded purplish-mauve flowers very freely. The foliage is broad.

To Saxifrage 'Tumbling Waters' (votes unanimous), from Capt. B. H. B. Symons-Jeune, Henley-on-Thames. This beautiful plant carried five long arching sprays of pure white flowers. It was raised by the exhibitor in 1913 by crossing a very fine form of *S. lingulata lantoscana* ♀ with × *S. longijolia* ♂. The former was collected on Monte Grammondo, and had longer and more untidy foliage and larger pure white flowers than the type. The beautiful hybrid is very vigorous and free-flowering, and will stand full sun. It makes off-shoots, which will easily root independently.

To *Schizanthus roseus compactus* (votes 8 for), from Messrs. Dobbie, Edinburgh. A very bushy, compact-growing variety, about one to one and a half feet high, covered with bright rosy-cerise flowers marked with yellow and brown in the centre.

To Sweet Pea 'George Shawyer' (votes unanimous), from Messrs. Dobbie, Edinburgh. A very beautiful orange-pink variety, having the wings slightly deeper in colour than the standard.

To Sweet Pea 'Hawmark Lavender' (votes 6 for), from Messrs. Alex. Dickson, Belfast. A fine lavender-blue variety of excellent form.

To Sweet Pea 'Picture' (votes unanimous), from Mr. R. Bolton, Halstead. This variety has a cream ground flushed with pale orange.

To Sweet Pea 'Tangerine' (votes 12 for, 3 against), from Mr. R. Bolton, Halstead. The flowers of this variety are of a very striking shade of bright orange-salmon.

Cultural Commendation.

To Mr. A. Perry, Enfield, for *Polystichum angulare divisilobum robustum*.

Other Exhibits :—

- Messrs. Bath, Wisbech : Dutch Irises.
 Messrs. Cutbush, Barnet : Petunia 'Mrs. Cutbush.'
 Mr. H. J. Damerum, Hayling Island : Sweet Pea 'Princess Patricia.'
 Mr. W. Day, Crowborough : Geranium 'Golden Tricolor Paul Crampel.'
 Mr. G. R. Downer, Chichester : Lupines and Gaillardias.
 Messrs. C. Elliott, Stevenage : hardy plants.
 Messrs. Gibson, Bedale : *Lupinus polyphyllus* 'Exquisite.'
 Messrs. Guest and Wheelwright, Sutton Coldfield : Geum 'Leslie V. Wheelwright.'
 Messrs. Jarman, Chard : Geranium 'Golden Flare' and Stock 'Jarman's Giant White Brompton.'
 Messrs. E. W. King, Coggeshall : Sweet Pea 'Sensation.'
 Rev. K. A. Lake, Teignmouth : Dianthus 'Red Devon.'
 Mr. G. W. Miller, Wisbech : *Chrysanthemum maximum* 'Majestic.'
 Mr. L. R. Russell, Richmond : *Myrtus communis marginata alba*.
 Mr. Shipley, Croydon : *Campanula erecta*.
 Mr. J. Stevenson, Wimborne : Sweet Pea 'Fair Lady.'
 Messrs. Tucker, Oxford : Delphinium 'Blue Bird.'
 Miss E. Willmott, V.M.H., Great Warley : *Clematis Sieboldii*, *Daphne lutea*, *Helwingia* sp., *Paeonia Woodwardii* var.
 G. Yeld, Esq., York : *Heemerocallis* 'Tangerine.'
 Yokohama Nursery Co., London : *Azalea obtusa* 'Kurume.'

FLORAL COMMITTEE, JUNE 15, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

- To Messrs. Bath, Wisbech, for hardy plants.
 To Messrs. Blackmore & Langdon, Bath, for Delphiniums.

Silver Flora Medal.

- To Messrs. Allwood, Haywards Heath, for Carnations.
 To Mr. R. Bolton, Halstead, for Sweet Peas.
 To Messrs. Cheal, Crawley, for hardy plants.
 To Mr. J. Douglas, Great Bookham, for Border Carnations.
 To Messrs. Kelway, Langport, for Delphiniums and Pæonies.
 To Mr. M. Prichard, Christchurch, for hardy plants.
 To Mr. L. R. Russell, Richmond, for stove plants.

Silver Grenfell Medal.

- To Messrs. B. R. Cant, Colchester, for Roses.
 To Mr. E. J. Hicks, Twyford, for Roses.

Silver Banksian Medal.

- To Messrs. Baker, Codsall, for hardy plants.
 To Messrs. Cutbush, Barnet, for Hydrangeas.
 To Mr. C. Engelmann, Saffron Walden, for Carnations.
 To Mr. G. Reuthe, Keston, for hardy plants.
 To Messrs. Simpson, Birmingham, for Antirrhinums.

Bronze Flora Medal.

- To Mr. H. J. Jones, Lewisham, for Spiræas.
 To Messrs. Ladhams, Southampton, for hardy plants.
 To Messrs. May, Upper Edmonton, for ferns and flowering plants.
 To Mr. W. Wells, jun., Merstham, for Delphiniums.

Bronze Banksian Medal.

To Messrs. Godfrey, Exmouth, for hardy plants.

To Rev. J. H. Pemberton, Romford, for Roses.

To Messrs. Piper, Langley, for hardy plants.

To Messrs. Rich, Bath, for hardy plants.

To Messrs. Tucker, Oxford, for hardy plants.

Award of Merit.

To Carnation 'New White Clove' (votes unanimous), from Mr. J. Douglas, Great Bookham. A large pure white Border variety, with broad smooth-edged petals and the fragrance of the 'Old Clove' Carnation.

To Delphinium 'Blue Bird' (votes 11 for, 5 against), from Messrs. Tucker, Oxford. The flowers of this tall variety are deep Gentian blue with a dark eye.

To Delphinium 'Pannonia' (votes 10 for, 4 against), from Messrs. Bath, Wisbech. This variety produces short sturdy spikes of clear deep-blue flowers, and is said to bloom nearly as freely in the autumn as in June. It is mildew-resistant.

To Gaillardia 'Downer's Double' (votes 11 for), from Mr. G. R. Downer, Chichester. A large semi-double variety measuring about four inches across. Its colour is rich golden yellow.

To *Pyracantha yunnanense*, Warley var. (votes unanimous), from Miss E. Willmott, V.M.H., Great Warley. A very beautiful shrub, bearing clusters of small, white flowers on long, slender, arching branches, which often measure as much as six feet in length. The flowers are followed by orange fruits in the autumn.

To Rose 'Mrs. Curnock Sawday' (votes 12 for, 2 against), from Mr. E. J. Hicks, Hurst. A beautiful hybrid Tea, producing long pointed buds which open to well-shaped flowers of a shell-pink colour, shaded with deep salmon-pink on the edges of the petals. It is said to be a good strong grower and an excellent Rose for the garden or for cut flower.

To Sweet Pea 'Le Mahdi' (votes 13 for), from Messrs. Ireland & Hitchcock, Marks Tey. A very handsome variety, having the standards reddish-purple, and the wings violet, shaded with deep heliotrope.

To Sweet Pea 'Mildred Howard' (votes 10 for, 1 against), from Mr. Robert Wright, Formby. A beautiful rosy-salmon and apricot variety with large standards.

Other Exhibits :—

Mrs. Barnard, Wimbledon : Pink 'Emily.'

Mr. A. E. Billingshurst, W. Croydon : Geranium 'Miss Belle Sureties.'

Mr. A. J. Crook, Winterbourne : Sweet Peas.

Mrs. F. Edwards, Bembridge : Roses.

G. Ferguson, Esq., Weybridge : Delphiniums.

Mr. F. Gifford, Hornchurch : Pink 'Glory.'

Misses Hopkins, Shepperton : hardy plants.

Misses S. Low, Bush Hill Park : Carnations.

Mrs. Mainwaring, Bembridge : Roses.

Messrs. Maxwell & Beale, Broadstone : hardy plants.

Mr. G. W. Miller, Wisbech : hardy plants.

Mr. A. Perry, Enfield : Liliiums &c.

Col. W. M. Pryor, D.S.O., Stevenage : *Primula Westonii*.

R.H.S. Gardens, Wisley : Rosa Farrer No. 84, *Buddleia alternifolia*.

Messrs. Sutton, Reading : Aquilegias.

Mr. C. Turner, Slough : Delphinium 'Penelope.'

FLORAL COMMITTEE, JUNE 29, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-seven members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Mr. R. Bolton, Halstead, for Sweet Peas.

To Messrs. Cuthbert, Southgate, for *Streptocarpus* and *Tritonias*.

Silver Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums.
To Mr. M. Pritchard, Christchurch, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.

Silver Grenfell Medal.

To Messrs. Bath, Wisbech, for Delphiniums.
To Messrs. Sutton, Reading, for Sweet Williams.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mr. C. Engelmann, Saffron Walden, for Carnations.
To Messrs. May, Upper Edmonton, for ferns and flowering plants.
To Mr. W. Wells, jun., Merstham, for Delphiniums.

Bronze Flora Medal.

To Mr. H. J. Damerum, Hayling Island, for Sweet Peas.
To Messrs. C. Elliott, Stevenage, for alpiners.
To Messrs. Maxwell & Beale, Broadstone, for hardy plants.
To Rev. J. H. Pemberton, Romford, for Roses.
To Messrs. Tucker, Oxford, for hardy plants.

Bronze Grenfell Medal.

To Messrs. Rich, Bath, for hardy plants.

Bronze Banksian Medal.

To Mrs. W. A. R. Heaven, Hockering, for Sweet Peas.
To Misses Hopkins, Shepperton, for hardy plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.

Award of Merit.

To Delphinium 'Blue Queen' (votes 9 for, 4 against), from Messrs. Blackmore & Langdon, Bath. The flowers of this variety are azure-blue with blackish-brown centre, single, and of medium size. They are carried on a well-formed spike.

To Delphinium 'Miss Marjorie Ferguson' (votes 14 for), from G. Ferguson, Esq., Weybridge. A charming semi-double variety. The flowers are large, sky-blue and mauve with white eye.

To Foxglove 'Shirley Strain' (votes 15 for, 1 against), from W. B. Cranfield, Esq., Enfield Chase. This magnificent strain of Foxgloves has been raised by Rev. W. Wilks at Shirley, and will be known as 'Shirley Foxgloves.' The average height of the plants is about seven feet, and the inflorescence is about five feet three inches. The bells are much larger than those of the wild type, and range in colour from pure white through pinks and rose to deep purple, while they are most beautifully blotched. Many of the plants have a branching habit and the flower bells of the side branches are equal to those on the main stem. The plants are excellent for the wild garden and need no support in the way of stakes.

To Sweet Pea 'Colne Valley' (votes 12 for, 5 against), from Mr. R. Bolton, Halstead. A very striking variety, having large flowers, the colour of which is mauve and blue mingled.

To Sweet Pea 'New Verdun' (votes 14 for, 4 against), from Mr. R. Bolton, Halstead. The standards of this variety are rich carmine, and the wings are rose flushed with cerise.

Other Exhibits :—

Mr. H. W. Acton, Wimbledon : Geranium 'H. Acton.'
Mr. G. R. Downer, Chichester : hardy plants.
Mr. F. Gifford, Hornchurch : Delphiniums.
Messrs. Jackman, Woking : Heleniums.
C. A. Jardine, Esq., London : Campanulas.
Mr. T. Poole, Guildford : Sweet Pea 'Mrs. Arthur Dickinson.'
A. Langley Smith, Esq., Catford : *Geranium pratense* 'Beatrice Easton.'
Mr. H. Weller, Ashted : Roses.

FLORAL COMMITTEE, JULY 13, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-nine members present.

Awards Recommended :—*Silver Flora Medal.*

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Grenfell Medal.

To Messrs. Peed, Streatham, for Clematis.

To Mr. M. Prichard, Christchurch, for hardy plants.

To Mr. G. Reuthe, Keston, for hardy plants.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for hardy plants.

To Major Churcher, Alverstoke, for Gladioli.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Messrs. May, Upper Edmonton, for ferns and flowering plants.

To Rev. J. H. Pemberton, Romford, for Roses.

Bronze Flora Medal.

To Messrs. Ladhams, Southampton, for hardy plants.

To Mr. W. Wells, jun., Merstham, for alpine.

Bronze Banksian Medal.

To Mr. G. W. Miller, Wisbech, for hardy plants.

Award of Merit.

To Carnation 'Mrs. T. Ives' (votes 22 for), from Messrs. Stuart Low, Bush Hill Park. A delicately perfumed, perpetual-flowering variety of excellent form. The colour of the flowers is a charming shade of salmon-pink, and the calyces seldom split.

To *Oenothera biennis* 'Golden Glow' (votes unanimous), from Messrs. Ladhams, Southampton. A useful hardy herbaceous plant bearing an abundance of deep-golden-yellow flowers. The buds are also rendered very attractive by reason of the dark red calyces which envelop them.

To *Sidalcea* 'Rose Queen' (votes 18 for, 2 against), from Mr. W. Wells, jun., Merstham. A very graceful, freely-branched, hardy herbaceous plant bearing rose-coloured flowers measuring 1 inch across. The plant is from 2 to 3 feet in height.

Other Exhibits.

Misses Hopkins, Shepperton : hardy plants.

S. Morris, Esq., Norwich : *Thalictrum dipterocarpum grandiflorum*.

FLORAL COMMITTEE, JULY 27, 1920.

Mr. G. PAUL, J.P., V.M.H., in the Chair, and eighteen members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Messrs. Velthuys, Hillegom, for Gladioli.

Silver-gilt Grenfell Medal.

To Mr. L. R. Russell, Richmond, for stove plants.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Barr, Taplow, for Gladioli.

To Mr. H. J. Jones, Lewisham, for Phlox.

To Rev. J. H. Pemberton, Romford, for Roses.

To Mr. W. Wells, jun., Merstham, for Delphiniums, etc.

Silver Grenfell Medal.

To Major Churcher, Alverstoke, for Gladioli.
To Messrs. Kelway, Langport, for Gladioli.
To Messrs. Ladhams, Southampton, for hardy plants.
To Mr. M. Prichard, Christchurch, for hardy plants.
To Messrs. Vert, Saffron Walden, for Hollyhocks.

Silver Banksian Medal.

Messrs. Bees, Chester, for Poppies, Liliums, etc.
To Messrs. Low, Bush Hill Park, for Carnations.

Bronze Flora Medal.

To Messrs. Cheal, Crawley, for hardy plants and Dahlias.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Mr. G. Reuthe, Keston, for hardy plants.

Bronze Banksian Medal.

To G. Cave, Esq., Wrabness, for Gladioli.
To Messrs. Maxwell, & Beale, Broadstone, for hardy plants.
To Mr. R. Prichard, West Moors, for hardy plants.

First-class Certificate.

To *Lilium Brownii kansuense* (votes 10 for), from Messrs. Clarence Elliott, Stevenage. This magnificent Lily was raised from seeds sent home from China by Mr. R. Farrer. The spike shown was about 5 feet high and carried eighteen open flowers and buds. The former are large, trumpet-shaped, whitish, heavily flushed with yellow inside and tinged with red on the outside. They are practically scentless. The linear acuminate leaves are distinct and add greatly to the beauty of the plant.

Award of Merit.

To *Campanula* × *Woodstock* (votes 6 for, 1 against), from E. H. Jenkins, Esq., Surbiton. A charming rock-plant about 6 inches high, resulting from a cross made by the exhibitor between '*Campanula Profusion No. 2*' and *C. arvensis*. The influence of the latter parent is seen in the form of the light violet-coloured flowers, while the freedom of flowering and the erect sturdy habit are characteristic of the other parent. The stems bear from six to nine flowers each.

To *Gladiolus* '*Atlanta*' (votes 10 for, 4 against), from Messrs. Krelage, Haarlem, Holland. A beautiful primulinus hybrid with pale-yellow flowers flushed with salmon, especially on the outer petals. This variety was raised by the exhibitor.

To *Gladiolus* '*Hermione*' (votes 15 for), from Messrs. Krelage, Haarlem, Holland. Another beautiful primulinus hybrid with salmon flowers, having the lower petals streaked with crimson. It was raised by the exhibitor.

To *Gladiolus* '*Painted Lady*' (votes unanimous), from Messrs. Kelway, Langport. A large and striking white variety with large red blotches on each petal.

To *Lavatera Olbia rosea* (votes 13 for), from Messrs. Ladhams, Southampton. The flowers of this variety are of a deep-rose colour, but in other respects are similar to those of the type which is well known in gardens.

To *Lilium pseudo-tigrinum* (votes 8 for, 3 against), from Messrs. Bees, Chester. A beautiful and very free-flowering lily, having reddish-orange flowers with recurved segments spotted on the inner surface.

To *Phlox* '*Alpha*' (votes 10 for, 1 against), from Messrs. Baker, Wolverhampton. A good *Phlox* with large rose-coloured flowers borne in trusses of large size. It is said to be the result of crossing *P. maculata* and *P. suffruticosa*.

To Sweet Pea '*Mascott's Helio*' (votes 11 for, 1 against), from Messrs. Ireland & Hitchcock, Marks Tey. A large and well-formed rosy-heliotrope variety of great promise.

To *Thalictrum dipterocarpum album* (votes unanimous), from S. Morris, Esq., Notwich. A pure white form of this beautiful plant.

Other Exhibits.

Mr. G. R. Downer, Chichester : hardy plants.
Mr. W. Easlea, Leigh-on-Sea : H. T. Rose '*Lulu*.'
Hon. Vicary Gibbs, Elstree : scented Pelargoniums.
Misses Hopkins, Shepperton : hardy plants.
Mrs. Pearson, Acton : Sweet Peas.
Miss Willmott, V.M.H., Great Warley : *Crassula sarcocaulis*, *Abelia Schuberti*.

FLORAL COMMITTEE, AUGUST 10, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and fourteen members present.

Awards Recommended :—*Award of Merit.*

To *Gladiolus* 'Banner of Hope' (votes unanimous), from Messrs. Kelway, Langport. A very fine white variety of large size, with faint lilac streaks at the base of the petals.

To *Gladiolus* 'Duke of Bedford' (votes 13 for), from Messrs. Kelway, Langport. A large-flowered bright-red variety having the inner petals mottled with cream. This should be a most useful *Gladiolus* for garden decoration.

To *Gladiolus* 'E. J. Shaylor' (votes 8 for), from Major Churcher, Alverstoke. A very distinct variety raised by Mr. A. E. Kunderd, Goshen, Ind., U.S.A. The blooms are large and of a pure deep rose-pink colour. The height of the plants is about 3 feet 6 inches.

To *Gladiolus* 'Mary Pickford' (votes 12 for), from Major Churcher, Alverstoke. This variety also was raised by Mr. A. E. Kunderd and it bears good spikes of very fine creamy-white flowers. Its height is about 2 feet 9 inches.

To *Gladiolus* 'Yellow Beauty' (votes unanimous), from Messrs. Kelway, Langport. A good clear sulphur-yellow variety of the 'Langprim' type. The spikes are very full and somewhat branched, and the inner petals of the flower have short crimson streaks at the base.

To *Montbretia* 'James Coey' (votes unanimous), from S. Morris, Esq. (gr. Mr. J. E. Fitt), Norwich. The flowers of this handsome variety measure about 4 inches across, and are of a deep orange-vermilion-red colour. The segments are shaded with yellow and blotched with crimson at the base.

To *Montbretia* 'Joan of Arc' (votes 12 for), from S. Morris, Esq., Norwich. A large clear apricot-yellow variety faintly marked with red. The flowers measure 3½ inches across.

To *Phlox* 'Dr. Charcot' (votes unanimous), from Mr. H. J. Jones, Lewisham. A free-flowering variety of good habit with large lilac-mauve flowers with a white centre.

To *Phlox* 'H. J. Jones' (votes unanimous), from Mr. H. J. Jones, Lewisham. A very showy variety, bearing big trusses of bright-orange flowers with a deep-crimson eye.

To *Phlox* 'Mrs. H. J. Jones' (votes unanimous), from Mr. H. J. Jones, Lewisham. A large clear-pink variety with a crimson eye.

The awards recommended to varieties of *Chrysanthemum maximum* at Wisley by the Sub-Committee were confirmed, viz. : **A.M.** to 'Mayfield Giant' (Brown), 'Marion Collier' (Collier), 'Omega' (Godfrey), 'Kenneth' (Baker, Stokes); **H.C.** to Winnie Stokes (Stokes).

Other Exhibit.

Messrs. Cheal, Crawley : *Sidalcea* 'Sussex Beauty.'

FLORAL COMMITTEE, AUGUST 24, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :—*Gold Medal.*

To Messrs. Sutton, Reading, for Annuals.

Silver-gilt Flora Medal.

To Messrs. Kelway, Langport, for *Gladioli*.

Silver-gilt Banksian Medal.

To Messrs. Cuthbert, Southgate, for *Streptocarpus* etc.

To Messrs. Ladhams, Southampton, for hardy plants.

Silver Flora Medal.

To Messrs. Alex. Dickson, Belfast, for China Asters.

To Mr. A. Perry, Enfield, for hardy plants.

To Mr. M. Prichard, Christchurch, for hardy plants.

To Mr. Reuthe, Keston, for hardy plants.

Silver Grenfell Medal.

To Messrs. Cutbush, Barnet, for Pentstemons.
To Rev. J. H. Pemberton, Romford, for Roses.
To Mr. L. R. Russell, Richmond, for stove plants.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Blackmore & Langdon, Bath, for Begonias and Delphiniums.
To Messrs. Wells, Merstham, for Chrysanthemums.
To Mr. W. Wells, jun., Merstham, for hardy plants.

Bronze Flora Medal.

To Mr. E. J. Hicks, Hurst, for Roses.

Bronze Banksian Medal.

To Mr. G. Downer, Chichester, for hardy plants.
To Mr. H. J. Jones, Lewisham, for Phloxes.
To Messrs. Luxford, Harlow, for Chrysanthemums.
To Messrs. Maxwell & Beale, Broadstone, for hardy plants.
To Mr. G. W. Miller, Wisbech, for hardy plants.
To Messrs. Reamsbottom, Geashill, for Anemones.
To Messrs. Rich, Bath, for hardy plants.

Award of Merit.

To China Aster 'Hawlmarm Terra Cotta' (votes unanimous), from Messrs. Alex. Dickson, Belfast. This is a fine, large, double variety of the 'Plume' type, and the colour is a very distinct reddish terra-cotta.

To Chrysanthemum 'Hollicott 1920' (votes 9 for), from Mr. W. Roots, Cranford. An early flowering variety with large well-formed deep yellow, incurved blooms.

To Gladiolus 'Golden Dream' (votes unanimous), from Messrs. R. Veitch, Exeter. This variety produces good spikes of handsome clear pale yellow flowers.

To Gladiolus 'Kelway's Masterpiece' (votes unanimous), from Messrs. Kelway, Langport. A very striking variety with large bright scarlet flowers borne in a good spike. The colour is somewhat deeper on the middle lower petal.

To Gladiolus 'Kelway's Monarch' (votes unanimous), from Messrs. Kelway, Langport. The flowers of this variety are of a good red colour tinged with crimson and feathered with white on the lower petals.

To Gladiolus 'Princess Radziwill' (votes unanimous), from Messrs. Kelway, Langport. A very large-flowered white variety streaked and flushed with deep rosy-lilac.

To Gladiolus 'Snowdon' (votes unanimous), from Messrs. Kelway, Langport. A white-flowered variety having the lower petals tinged with pale primrose-yellow and streaked with crimson at the base. The blooms are borne on a good spike.

To *Heliopsis scabra* 'Orange King' (votes 9 for), from Mr. C. Turner, Slough. An improved form of this North American, hardy, herbaceous perennial, with large deep golden-yellow flowers produced with great freedom.

To *Pyrus firma* (votes unanimous), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. This handsome *Pyrus* has deeply lobed serrated leaves, measuring roughly 3 inches by 2 inches. They are dark green above and tomentose below. The fruits, which are borne in bunches of about twenty, are bright scarlet and measure slightly over $\frac{1}{2}$ inch in diameter. They are flattened at the base and have the eye closed, and are dotted with a few inconspicuous light brown spots.

To *Streptocarpus* 'Cuthbert's Giant Flowering Strain' (votes unanimous), from Messrs. Cuthbert, Southgate. A very fine strain, including blue, white, pink, rose, and violet varieties. The blooms are very large, and two distinct varieties, 'Rose Queen' and 'Southgate White,' have already received Awards of Merit.

The Awards of Merit recommended to the three following plants at Wisley by a Sub-Committee on August 13, 1920, were confirmed:

Euonymus nanus Bieberstein. A low usually partly evergreen shrub, growing about 2 feet 6 inches high, easily kept from straggling by pruning. Leaves very narrow, smooth, and dark green. Very ornamental by its bright pink fruits with orange seeds, always freely produced in August at Wisley. Native from Caucasus to China. Introduced in 1830.

Malva Alcea fastigiata. A very floriferous plant long grown at Wisley, and suitable for either wild garden or border—growing erect to a height of about 3 feet, and flowering over a long period in July, August, and September. Hardy. Flowers about $1\frac{1}{2}$ inch in diameter.

Phlox 'Aldersey.' Sent to Wisley by Hugh Aldersey, Esq., of Crooke Aldersey, Cheshire, January 1920. A variety of *P. decussata* with large flowers of a rose-red colour with a deeper eye, of excellent form and size, and standing weather well. Trusses large, stems strong.

The Awards recommended to Antirrhinums at Wisley by the Sub-Committee were confirmed (see p. 357).

The following Dahlias were selected by a Joint Committee of the R.H.S. and the National Dahlia Society for trial at Wisley:—

From Messrs. Stredwick, St. Leonards: 'Africa' (Dec.), 'Emperor' (Cactus), 'Magnet' (Cactus), 'Miss F. Freeman' (Dec.), 'Moloch' (Dec.), 'Peerless' (Cactus), 'Redwing' (Cactus), 'Rival' (Cactus), 'Satisfaction' (Dec.), 'Water Lily' (Dec.).

From Messrs. Cheal, Crawley: 'Surrey Star' (Star).

From Mr. J. A. Jarrett, Anerley: 'Lemonette' (Pæony), 'Nankie Ritchie' (Coll.), 'Redhead' (Dec.).

From Mr. J. T. West, Brentwood, and Mr. J. B. Riding, Chingford: 'Dr. Tevis' (Dec.).

Other Exhibits.

Mr. W. Earp, Lamberhurst: seedling Pansy.

Mr. W. A. Murton, Twickenham: Viola 'The Bee.'

Sir Philip H. Waterlow, Bt., Wrotham: *Campanula lactiflora*, Molyneux Trosley Towers var.

FLORAL COMMITTEE, SEPTEMBER 7, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Alex. Dickson, Belfast, for China Asters.

Silver Flora Medal.

To Messrs. Carter Page, London, for Dahlias.

To Mr. L. R. Russell, Richmond, for stove and greenhouse plants.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Grenfell Medal.

To Messrs. Barr, Taplow, for Gladioli.

To Rev. J. H. Pemberton, for Roses.

To Mr. G. Reuthe, Keston, for hardy plants.

To Mr. W. Wells, jun., Merstham, for hardy plants.

To Mr. J. T. West, Brentwood, for Dahlias.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. House, Bristol, for Scabiosas.

To Mr. C. Turner, Slough, for Dahlias.

To Messrs. Whitelegg, Chislehurst, for hardy plants.

Bronze Flora Medal.

To Messrs. Cutbush, Barnet, for annuals.

To Mr. E. J. Hicks, Twyford, for Roses.

To Messrs. Paul, Waltham Cross, for Roses.

To Messrs. Velthuys, Hillegom, for Gladioli.

Bronze Grenfell Medal.

To Messrs. Godfrey, Exmouth, for Scabiosas.

Bronze Banksian Medal.

To Messrs. Cheal, Crawley, for hardy plants.

To Misses Hopkins, Shepperton, for hardy plants.

To Messrs. Maxwell & Beale, Broadstone, for hardy plants.

First-class Certificate.

To *Gentiana Farveri* (votes unanimous), from Mr. W. Wells, jun., Merstham. This beautiful Gentian received an Award of Merit on September 9, 1919, and is described under the proceedings of the Floral Committee for that day.

Award of Merit.

To Chrysanthemum 'Brilliant' (votes 9 for), from Mr. H. J. Jones, Lewisham. A good garden variety of great decorative value and nice form. The flowers are of a bright bronzy-orange colour.

To Rose 'Glory of Hurst' (votes 11 for, 5 against), from Mr. E. J. Hicks, Twyford. A useful addition to the Dwarf Polyantha Roses. The semi-double flowers are deep carmine-pink with a white eye, and the inflorescence is similar in type to that of 'Crimson Rambler.'

To *Scabiosa caucasica* 'Diamond' (votes unanimous), from Messrs. House, Bristol. The striking feature of this variety is the great depth of the charming lavender-blue colour of the flowers, which measure about $3\frac{1}{4}$ inches across.

To *Scabiosa caucasica* 'Pride of Exmouth' (votes unanimous), from Messrs. Godfrey, Exmouth. The flowers of this variety are larger than those of the one mentioned above, being fully 4 inches across. The colour is pale lavender-blue, which deepens somewhat towards the outer edges of the flowers.

The following Dahlias were selected by a Joint Committee of the R.H.S. and the National Dahlia Society for trial at Wisley:—

From Messrs. Stredwick, St. Leonards: 'Crimson Beauty' (Dec.), 'Miss Hasnip' (Cactus), 'Miss Honey' (Cactus), 'Zanzibar' (Dec.).

From Messrs. Burrell, Cambridge: 'Barbara' (Coll.), 'Ebor' (Dec.), 'Edith Jones' (Min. Pæony), 'Elegance' (Min. Pæony), 'Nancy' (Dec.), 'Rosie' (Min. Pæony), 'Triton' (Pæony).

From Messrs. Dobbie, Edinburgh: 'Columba' (Coll.), 'Hussar' (Coll.), 'Lochnagar' (Coll.), 'Mountaineer' (Coll.).

From Mr. C. Turner, Slough: 'Felicia' (Star).

From Messrs. Krelage, Haarlem: 'Fuga' (Coll.), 'Mrs. Krelage' (Cactus), 'Orange Sun' (Pæony).

From Mr. H. Brown, Luton: 'Cardinal' (Coll.).

Other Exhibits.

Messrs. Artindale, Sheffield: *Bidens dahlioides*.

Mr. G. Cave, Wrabness: *Gladiolus* 'Anthony B. Kunderd.'

Major Churcher, Alverstoke: *Gladioli*.

Dr. R. Ruggles Gates, Royal Botanic Gardens, London: *Oenothera* hybrids.

Mr. J. J. Kettle, Corfe Mullen: Violets.

Mrs. Oswald Magniac, Nursling: Aster 'Joan Olivia.'

Messrs. Nash, Taunton: Geranium seedling.

Mr. G. H. Quint, Princes Risboro: Dahlia 'Gwenie Quint.'

FLORAL COMMITTEE, SEPTEMBER 21, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-five members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Barr, Taplow, for *Gladioli* and *Nerines*.

Silver Flora Medal.

To Messrs. House, Westbury-on-Trym, for *Scabiosas*.

To Messrs. Ladhams, Southampton, for *Lobelias*.

To Messrs. Carter Page, London, for *Dahlias*.

To Mr. W. Wells, jun., Merstham, for hardy plants.

Silver Grenfell Medal.

- To Messrs. Allwood, Haywards Heath, for Carnations.
- To Messrs. Cheal, Crawley, for Dahlias.
- To Messrs. Cutbush, Barnet, for Asters.
- To Mr. A. Perry, Enfield, for hardy plants.
- To Mr. J. T. West, Brentwood, for Dahlias.

Silver Banksian Medal.

- To Messrs. Cheal, Crawley, for shrubs.
- To Messrs. Godfrey, Exmouth, for Scabiosas.
- To Mr. M. Pritchard, Christchurch, for hardy plants.
- To Mr. G. Reuthe, Keston, for hardy plants.
- To Messrs. L. R. Russell, Richmond, for hardy plants.

Bronze Flora Medal.

- To Messrs. Bunyard, Maidstone, for hardy plants.
- To Messrs. May, Upper Edmonton, for ferns and flowering plants.

Bronze Banksian Medal.

- To Messrs. Baker, Wolverhampton, for hardy plants.
- To Misses Hopkins, Shepperton, for hardy plants.
- To Rev. J. H. Pemberton, Romford, for Roses.
- To Messrs. Reamsbottom, Geashill, for Anemones.

First-class Certificate.

To Nerine 'Hera' (votes unanimous), from J. Rose, Esq., Oxford. This very handsome variety resulted from a cross between a *N. curvifolia* hybrid and *N. Bowdeni*. The scapes are quite 3 feet high, terminated by large umbels of bright rose-carmine flowers, which have broad perianth segments and are much larger than those of *N. Bowdeni*. The plant is nearly evergreen, and the foliage is very broad and deeply furrowed. This excellent plant was raised by the exhibitor in 1908 and first flowered in 1912.

Award of Merit.

To Aster 'Maggie Perry' (votes 18 for, 1 against), from Mr. A. Perry, Enfield. A very effective Michaelmas Daisy, with lavender-mauve, semi-double flowers.

To Aster 'Perry's White' (votes 14 for, 3 against), from Mr. A. Perry, Enfield. A fine pure-white single variety of the *Novi Belgii* type.

To Aster 'Rachael Ballard' (votes 13 for, 1 against), from Messrs. Baker, Wolverhampton. A very pretty variety with semi-double, rosy-mauve flowers. It grows 4 feet high and is of the *Novi Belgii* type, flowering from the middle to the end of September.

To Chrysanthemum 'Hollicott Beauty' (votes 19 for), from Mr. W. Roots, Cranford. An early-flowering Japanese variety with medium-sized orange-bronze blooms of good form and substance.

To *Cotoneaster Henryi* (votes unanimous), from S. Morris, Esq., Norwich. A distinct shrub of very neat habit, very freely producing axillary clusters of red berries. The plant branches somewhat horizontally, and the lanceolate leaves are shining green above, deeply veined, and white underneath.

To Helianthus 'Monarch' (votes unanimous), from Mr. M. Pritchard, Christchurch. A fine autumn border plant, attaining a height of 7 or 8 feet. The dark centred flowers are very large and of a deep golden-yellow colour. They are borne on stiff purplish stems.

To Nerine 'Mascotte' (votes unanimous), from Messrs. Barr, Taplow. A fine variety of the Fothergilli type, with large flowers of crimson-carmine having a central band of scarlet.

The following Dahlias were selected for trial at Wisley :—

From Messrs. Burrell, Cambridge: 'Audrey' (Min. Pæony), 'Crimson King' (Pæony), 'Ivor' (Coll.), 'Prudence' (Coll.).

From Mr. J. A. Jarrett, Anerley: 'Anerley Scarlet' (Garden Dec.), 'Dickie Ellis' (Coll.), 'Rigidity' (Dec.), 'Stability' (Dec.).

From Messrs. Stredwick, St. Leonards: 'Goldfinch' (Coll.).

From Mr. C. Turner, Slough: 'Joan' (Star), 'Ladas' (Coll.), 'Leda' (Star).

Other Exhibits.

Mr. A. S. Dunton, Wolverhampton : Chrysanthemum 'Golden Goacher.'
 C. Eley, Esq., East Bergholt : *Pyrus Eleyi*.
 Mr. J. Harding, Nantwich : Chrysanthemums.
 Mr. H. Hilton, Sevenoaks : seedling Colletterette Dahlia.
 Messrs. Luxford, Harlow : Chrysanthemum 'Mary Mason.'
 Mrs. Luxmoore, Durham : Border Carnation.
 Messrs. Maxwell & Beale, Broadstone : hardy plants.
 Mr. G. W. Miller, Wisbech : Asters.
 Messrs. A. W. Thorpe, Lichfield : Chrysanthemums.
 W. van de Weyer, Esq., Corfe Castle : Buddleia hybrids.

FLORAL COMMITTEE, OCTOBER 5, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-seven members present.

Awards Recommended :—

First-class Certificate.

To *Columnea gloriosa purpurea* (votes 18 for, 1 against), from Sir H. S. Leon, Bt. (gr. Mr. W. W. Field), Bletchley. A very handsome stove-plant belonging to the Gesneraceae. The pendulous growths, nearly 2 feet in length, have very ornamental, ovate, bronzy leaves, which are fleshy and softly pubescent. The young leaves are of a purplish tint. The flowers are large and hooded and of a very brilliant orange-scarlet colour. They are borne in considerable numbers.

To Nerine 'Aurora' (votes unanimous), from J. Rose, Esq., Oxford. This is a remarkable Nerine raised as the result of a cross between a *N. curvifolia* hybrid and *N. Bowdenti*. It is almost evergreen, and throws up scapes nearly 3 feet high with beautiful deep-pink flowers, which have the tips of the segments recurved and are borne on pedicels about 2½ inches long.

Award of Merit.

To Aster 'Elsa' (votes unanimous), from Mr. G. W. Miller, Wisbech. An excellent double Michaelmas Daisy, growing to the height of 3 to 4 feet. The colour of the flowers is bright rosy-lavender.

To Aster 'Grace Sweet' (votes unanimous), from Hon. Vicary Gibbs, Elstree. A very charming variety of the Novi Belgii section with delicate blue, semi-double flowers.

To Aster 'Queen of the Lilacs' (votes unanimous), from Hon. Vicary Gibbs, Elstree. A strong-growing clear-lilac variety of the Novi Belgii section.

To Carnation 'Lord Lambourne' (votes 17 for, 3 against), from Messrs. S. Low, Enfield. A bright red perpetual-flowering variety of excellent form and with a sweet perfume.

To Carnation 'White Pearl' (votes unanimous), from Messrs. S. Low, Enfield. An excellent pure white variety of the perpetual flowering type. The blooms are very large, of perfect form borne on rigid stems and have a delicious Clove scent. This variety is considered by experts to be the finest white Carnation yet introduced.

To Chrysanthemum 'Blanche du Poitou' (votes unanimous), from Messrs. Wells, Merstham. A large pure-white early-flowering variety of splendid form and substance.

To Chrysanthemum 'Pink Profusion' (votes 13 for, 4 against), from Mr. H. J. Jones, Lewisham. A medium-sized early-flowering Japanese variety with well-shaped blooms of a deep rose-pink colour, which lights up exceptionally well under artificial light. The flowers exhibited were cut from the open ground.

To *Polygonum campanulatum* (votes 16 for), from Messrs. Ladhams, Southampton. A very beautiful and highly ornamental plant growing about 3 feet high, and bearing branching inflorescences of white flowers tinted with pink.

The following Dahlias sent by Messrs. Burrell, Cambridge, were selected for trial at Wisley :—

Coronette (Colletterette), 'Mrs. H. J. Jones' (Dec.), 'Selma' (Min. Pæony fld.).

Other Exhibits.

- Messrs. Bath, Wisbech : Dahlias.
 Messrs. Cheal, Crawley : Dahlias.
 Mr. G. R. Downer, Chichester : Asters.
 Mr. J. Harding, Nantwich : Chrysanthemum 'Harvester.'
 Marquess of Headfort, Kells : *Lilium* sp. 10961.
 Mr. J. A. Jarrett, Anerley : Dahlias.
 Messrs. Luxford, Harlow : Chrysanthemums.
 Mr. R. C. Notcutt, Woodbridge : *Eupatorium Weinmannianum* and
Eleutherococcus Henryi.
 Mr. F. G. Preston, Cambridge : *Lonicera pileata* in fruit.
 Messrs. Waterer Sons & Crisp, Twyford : hardy plants.
 Mr. W. Wells, jun., Merstham : hardy plants.
 Mr. H. Woolman, Shirley : Chrysanthemums.

The following awards recommended to Annual Coreopsis at Wisley by the Sub-Committee were confirmed :—

Highly Commended :—

- Nos. 3 & 4, 'Drummondii,' sent by Messrs. Barr & R. Veitch.
 No. 5, 'Tiger Star,' re-selected, sent by Messrs. Watkins & Simpson.
 No. 6, 'Tiger Star,' sent by Messrs. Sydenham.
 No. 7, 'compacta radiata Tiger Star,' sent by Messrs. Barr.
 No. 17, 'nigra speciosa' re-selected, sent by Messrs. Watkins & Simpson.
 No. 18, 'Fire King,' sent by Messrs. Watkins & Simpson.
 No. 20, 'Tom Thumb Crimson King,' sent by Messrs. Bair.
 No. 21, 'Crimson King,' sent by Messrs. Watkins & Simpson.

FLORAL COMMITTEE, OCTOBER 19, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To C. A. Cain, Esq., Welwyn, for Begonias.

Silver Flora Medal.

- To Messrs. Cheal, Crawley, for shrubs and Dahlias.
 To Messrs. Piper, Langley, for rock and water garden.
 To Mr. J. B. Riding, Chingford, for Dahlias.
 To Messrs. Russell, Richmond, for stove and hardy plants.

Silver Grenfell Medal.

- To Messrs. Allwood, Haywards Heath, for Carnations.
 To Mr. N. Davis, Framfield, for Chrysanthemums.
 To Mr. E. J. Hicks, Twyford, for Roses.
 To Mr. H. J. Jones, Lewisham, for Chrysanthemums.
 To Messrs. S. Low, Bush Hill Park, for Carnations.
 To Messrs. Carter Page, London, for Dahlias.

Silver Banksian Medal.

- To Mr. Lilley, Guernsey, for Nerines.
 To Messrs. Luxford, Harlow, for Chrysanthemums.
 To Messrs. Wells, Merstham, for Chrysanthemums.
 To Mr. W. Wells, jun., Merstham, for hardy plants.

Bronze Flora Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

Bronze Banksian Medal.

- To Messrs. Baker, Wolverhampton, for Asters and Poppies.
 To Messrs. Cutbush, Barnet, for Asters.
 To Rev. J. H. Pemberton, Romford, for Roses.
 To Messrs. Reamsbottom, Geashill, Anemones.

Award of Merit.

To Chrysanthemum 'Majestic' (votes 14 for), from Mr. N. Davis, Framfield. A golden amber Japanese exhibition variety with broad, slightly incurved florets.

To Chrysanthemum 'Mrs. George Monro' (votes 15 for), from Mr. N. Davis, Framfield. A large-flowered Japanese variety with broad, slightly curled florets. The colour is a rich crimson with a buff reverse.

To Chrysanthemum 'Sorcerer' (votes 16 for), from Messrs. Luxford, Harlow. A medium-sized Japanese variety which will probably become popular for market work. Its colour is light chestnut-bronze tipped with dull gold.

To *Clematis tangutica* var. *obtusiuscula* Rehd. and Wils. (votes unanimous), from R.H.S. Gardens, Wisley. The Floral Sub-Committee recommended an A.M. to this plant as growing at Wisley on September 23, 1920. The variety has more obtuse sepals and a rounder flower than the type, which is nearly allied to *C. orientalis*. It flowers profusely from June to October, and its yellow flowers solitary on 5 or 6 inch pedicels are very showy. It is perfectly hardy at Wisley, and was collected by Purdom in W. Kansu. Farrer also sent home seed, but the plants raised appear to be somewhat smaller flowered and less vigorous.

To *Euonymus europaeus intermedius* (votes unanimous), from S. Morris, Esq., Norwich. This highly ornamental variety is chiefly valuable on account of its particularly free-fruited habit. The fruits are bright in colour, but otherwise similar to those of the type.

The awards recommended to Michaelmas Daisies at Wisley by the Sub-Committee were confirmed (see p. 368).

Other Exhibits.

Messrs. Barr, Taplow : *Nicandra piloseloides*.

Mr. G. Carpenter, Byfleet : Carnation 'Mrs. F. M. Stoop.'

Messrs. H. Chapman, Rye : Nerines.

Misses Hopkins, Shepperton : hardy plants.

Messrs. House, Bristol : Scabiosas.

Mrs. Tillotson, Southampton : *Echeveria rubra*.

Mr. C. Turner, Slough : Dahlias.

FLORAL COMMITTEE, NOVEMBER 2, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To 'Lady Ann' (gr. Mr. Sharnbrook), Derby, for Cyclamen.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Banksian Medal.

To Messrs. S. Low, Bush Hill Park, for Carnations and Begonias.

To Mr. G. Reuthe, Keston, for hardy plants.

Award of Merit.

To Chrysanthemum 'Huntsman' (votes unanimous), from Messrs. Wells, Merstham. A large chestnut-red Japanese variety of excellent form with a gold reverse.

To Chrysanthemum 'Pourpre Poitevin' (votes 11 for, 3 against), from Messrs. Wells, Merstham. A medium-sized Japanese variety of a beautiful dark-crimson colour shaded with purple.

To *Cotoneaster frigida Vicarii* (votes unanimous), from Hon. Vicary Gibbs (gr. Mr. E. Beckett, V.M.H.), Elstree. This is a very fine variety of the well-known *Cotoneaster frigida*, and it is said to be magnificent in tree form. The berries are larger and of a brighter red than those of the type. The lanceolate leaves are deep green above and grey below.

To *Cotoneaster salicifolia floccosa* (votes unanimous), from Hon. Vicary Gibbs, Elstree. This is a handsome shrub with flattened spreading boughs laden with small red fruits in dense clusters. The narrow leaves are lanceolate, deep green, and the veining is very conspicuous.

Other Exhibits.

Mr. G. Carpenter, Byfleet: Carnations and Chrysanthemums.
Messrs. Cragg, Harrison & Cragg, Heston: Chrysanthemums.
Mr. J. J. Kettle, Corfe Mullen: Violets.
Messrs. L. R. Russell, Richmond: *Dracaena incomparabilis*.

FLORAL COMMITTEE, NOVEMBER 16, 1920.

Awards Recommended :—

Gold Medal.

To Mr. P. Ladds, Swanley Junction, for Ericas.
To Messrs. Wells, Merstham, for Chrysanthemums.

Silver-gilt Flora Medal.

To Mr. H. J. Jones, Lewisham, for Chrysanthemums.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. Cutbush, Barnet, for Carnations, &c.
To Messrs. S. Low, Bush Hill Park, for Carnations and Begonias.
To Messrs. Luxford, Harlow, for Chrysanthemums.
To Messrs. L. R. Russell, Richmond, for stove plants.

Silver Banksian Medal.

To Messrs. Godfrey, Exmouth, for Chrysanthemums.

Bronze Banksian Medal.

To Mr. G. Reuthe, Keston, for hardy plants.
To Mr. W. Wells, jun., Merstham, for hardy plants.

Award of Merit.

To *Berberis* × *ferax* (votes unanimous), from R.H.S. Gardens, Wisley. This beautiful *Berberis* is a natural hybrid and bears on its gracefully arching sprays innumerable small roundish berries of a bright coral-red colour. Its small leaves are spatulate and measure from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. in length.

To Chrysanthemum 'Major Chichester' (votes 14 for, 1 against), from Mr. H. J. Jones, Lewisham. A rich yellow Japanese variety of excellent form and substance.

To Chrysanthemum 'Norman Chittenden' (votes 13 for, 2 against), from Messrs. Luxford, Harlow. A magnificent white Japanese variety.

To Chrysanthemum 'Teresa' (votes unanimous), from Messrs. Luxford, Harlow. A bronzy-apricot decorative variety, which should prove very valuable for market work.

Cultural Commendation.

To Sir H. S. Leon, Bt. (gr. Mr. W. W. Field), Bletchley, for a plant of *Cephalotus follicularis*.

Other Exhibits.

Mr. J. Barker, Wilpshire: Chrysanthemum 'Wilpshire Beauty.'
Messrs. Cragg, Harrison & Cragg, Heston: Chrysanthemum 'Catriona.'
Miss Harris, South Kensington: miniature gardens.
Misses Hopkins, Shepperton: hardy plants.
Mr. J. J. Kettle, Corfe Mullen: Violets.
Mrs. Newland, Frimley: Chrysanthemum 'Mrs. Newland.'
Messrs. Reamsbottom, Geashill: Anemones.

FLORAL COMMITTEE, NOVEMBER 30, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-eight members present.

Awards Recommended :—

Gold Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Mr. C. Engelmann, Saffron Walden, for Carnations.
To Messrs. Sweet, Whetstone, for Ericas.

Silver-gilt Banksian Medal.

To Messrs. Luxford, Harlow, for Chrysanthemums.
To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Flora Medal.

To Mr. MacDonald, Harpenden, for grasses.

Silver Banksian Medal.

To C. A. Cain, Esq., Welwyn, for Carnations.
To Mr. G. Reuthe, Keston, for rare Conifers.
To Messrs. S. Low, Bush Hill Park, for Carnations and Begonias.

Bronze Flora Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

Bronze Banksian Medal.

To Messrs. Cutbush, Barnet, for Carnations.
To Messrs. Godfrey, Exmouth, for Chrysanthemums.
To Messrs. Reamsbottom, Geashill, for Anemones.
To Messrs. Russell, Richmond, for Azaleas.

Award of Merit.

To Carnation 'Laddie' (votes unanimous), from Mr. C. Engelmann, Saffron Walden. A beautiful salmon-pink perpetual-flowering Carnation of good form and substance and of large size.

To *Myosotis oblongata* 'Bluebird' (votes 12 for, 5 against), from Mr. C. Engelmann, Saffron Walden. A charming and very free-flowering Forget-me-not with light-blue, white-eyed flowers. The plant is a robust grower, 9 inches high, and flowers over a very long period.

Cultural Commendation.

To Sir H. S. Leon, Bart. (gr. Mr. W. W. Field), Bletchley, for a plant of *Nepenthes rufescens*.

Other Exhibits.

Misses Hopkins, Shepperton : hardy plants.

Mr. H. J. Jones, Lewisham : Chrysanthemum 'Winter Glow.'

Mr. A. J. Sanders, Haywards Heath : Chrysanthemum 'Mrs. Wilfred Loder.'

FLORAL COMMITTEE, DECEMBER 14, 1920.

Mr. H. B. MAY, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
To Messrs. S. Low, Bush Hill Park, for Carnations.

Bronze Flora Medal.

To Mr. S. Aish, Dunstable, for Chrysanthemums.

Bronze Banksian Medal.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

Award of Merit.

To Carnation 'Edward Allwood' (votes unanimous), from Messrs. Allwood, Haywards Heath. A scarlet perpetual-flowering variety of excellent form. The blooms are borne on stiff stems and are sweetly perfumed.

To Chrysanthemum 'Winter Glow' (votes 10 for, 5 against), from Mr. H. J. Jones, Lewisham. A large decorative Japanese variety of a deep rose-pink colour.

To Chrysanthemum 'Christmas Wonder' (votes 16 for, 6 against), from Mr. H. J. Jones, Lewisham. A small single white variety which produces its beautiful sprays of bloom in wonderful profusion. It should be a great acquisition for decorative work.

Other Exhibits.

Messrs. H. Chapman, Rye: Freesias.

Mr. C. Engelmann, Saffron Walden: *Myosotis* 'Bluebird.'

Mr. F. Harvey, Lincoln: Chrysanthemum 'Romaine.'

Misses Hopkins, Shepperton: hardy plants.

Messrs. Reamsbottom, Geashill: Anemones.

ORCHID COMMITTEE.

JANUARY 13, 1920.

Sir HARRY J. VEITCH in the Chair, and nineteen members present.

Awards Recommended :—

Silver Flora Medal.

To Lady Ludlow, Luton Hoo (gr. Mr. Metcalfe), for sixty plants of *Laelia Gouldiana*, bearing together 430 flowers.

To Mrs. William Raphael, Englefield Green (gr. Mr. Brown), for spikes of the white *Calanthe Harrisii*.

To Messrs. Charlesworth, Haywards Heath, for hybrids.

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for hybrids and species.

To Messrs. Flory & Black, Slough, for *Sophranitis* crosses.

First-class Certificate.

To *Odontioda* × 'Nada,' Ralli's var. (*Oda.* × 'Red Cross' × *Odm. eximium*) (votes unanimous), from Pantia Ralli, Esq., Ashted Park, Surrey. Flowers large and with broad segments, deep crimson with a golden glow, the margins pure white.

Award of Merit.

To *Laeliocattleya* × 'Alborak' (*L.-c.* × 'Isabel Sander' × *C.* × 'Maggie Raphael' *alba*) (votes 12 for, 1 against) from Baron Bruno Schröder, Englefield Green. A fine flower with white sepals and petals, and purplish-rose front to the lip.

To *Odontoglossum* × *Thwaitesiae*, Fasey's var. (*O. Harryanum* × *O. Rossii rubescens*) (votes 11 for, 1 against), from W. R. Fasey, Esq., Holly Bush Hill, Snarebrook. In shape and colour nearest to *O. Rossii*. Sepals and petals barred with claret; lip mauve.

Other Exhibits.

Sir Jeremiah Colman, Bt.: *Odontoglossum* × 'Gatton Princess.'

Baron Schröder: *Laeliocattleya* × *Schroederae* and *Cypripediums*.

ORCHID COMMITTEE, JANUARY 27, 1920.

Sir HARRY J. VEITCH in the Chair, and twenty members present.

Awards Recommended :

Silver Gilt Flora Medal.

To Messrs. Armstrong & Brown, Orchidhurst, Tunbridge Wells, for hybrids, including new seedling *Odontoglossums*.

Silver Flora Medal.

To Messrs. Charlesworth, for *Cattleyas*, *Laeliocattleyas*, etc.

To Messrs. Stuart Low, Jarvisbrook, Sussex, for a group.

To Messrs. Hassall, Southgate, for *Cymbidium*s.

Silver Banksian Medal.

To Messrs. J. Cypher, Cheltenham, for *Cypripedium*s.

To Messrs. Sanders, for *Odontiodas*, *Odontoglossums*, and *Cypripedium*s.

Award of Merit.

To *Cattleya* × 'Mrs. Jas. Watson,' The Dell var. (*C.* × 'Maggie Raphael' *alba* × 'Trianae') (votes unanimous), from Baron Bruno Schröder. In effect a large, improved *C. Trianae* with pure white sepals and petals. Lip reddish-purple in front, disc yellow.

To *Cymbidium* × *albanense*, Joicey's var. (*C. erythrostylum* × *C. insigne*) (votes 13 for, 5 against), from J. J. Joicey, Esq., Witley, Surrey. The plant bore a fine spike of large blush-white flowers, with dark claret markings on the lip.

Cultural Commendation.

To Mr. Farnes, orchid-grower to Pantia Ralli, Esq., for a good specimen of *Oncidioda* × *Cooksoniae*, with many red flowers.

Other Exhibits.

Sir Jeremiah Colman, Bt. : *Brassocattleya* × 'Gatton Lily,' var. *majestica*.

Dr. Miguel Lacroze : four new hybrids.

C. J. Lucas, Esq. : *Odontoglossum* × *dircimium*.

W. R. Fasey, Esq. : *Odontioda* × *Cooksoniae*, scarlet variety.

ORCHID COMMITTEE, FEBRUARY 10, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and nineteen members present.

Awards Recommended :—

Silver Gilt Flora Medal.

To Messrs. McBean, Cooksbridge, for *Cattleyas*, *Laeliocattleyas*, etc.

To Messrs. Stuart Low, for hybrids.

Silver Flora Medal.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill, for hybrids and interesting species.

To Messrs. Charlesworth, for *Odontoglossums*, *Odontiodas*, and other hybrids.

Silver Banksian Medal.

To Colonel Cary-Batten, for *Cypripediums*.

To Messrs. Sanders, for hybrids and species.

To Messrs. Flory & Black, for hybrids.

To Messrs. J. Cypher, for *Cypripediums*.

First-class Certificate.

To *Cypripedium* × 'Memoria F.M. Ogilvie' (*C. Curtmannii* × *C.* × 'Pyramus') (votes unanimous), from Messrs. Armstrong & Brown. A large and finely formed flower. Dorsal sepal white blotched with claret-red. Petals and lip yellow, tinged and spotted with chocolate-purple.

To *Odontonia* × *Pittiae* (*M.* × *Bleuana* × *Odm.* × *Harryanum*) (votes unanimous), from Messrs. Charlesworth. A distinct novelty with form nearest to *M.* × *Bleuana*, but with a more concave lip. Flower dark violet with lighter margins and a few yellow lines at the base of the lip.

Award of Merit.

To *Odontoglossum* × *crispo-Solon* (*O. crispum* × *O.* × 'Solon') (votes unanimous), from H. T. Pitt, Esq. Flowers white with dark-claret blotches on the inner parts of the segments.

To *Odontoglossum* × 'Dorothy Arkle' (parentage unrecorded) (votes 9 for, 4 against), from Messrs. Charlesworth. Large and of good shape; white blotched with claret-red.

Cultural Commendation.

To Mr. Farnes, orchid-grower to Pantia Ralli, Esq., for *Cymbidium* × *Gottianum* with several spikes.

To Mr. Gillett, grower to Colonel Stephenson Clarke, C.B., for *Lycaste* × *Balliae* with nine flowers.

To Messrs. McBean, for *Odontioda* × *Bradshawiae* 'Olympus.'

Other Exhibits.

Dr. Miguel Lacroze : *Laeliocattleya* × 'Linda' var. 'Roehampton.'

R. G. Thwaites, Esq. : *Odontiodas*.

Messrs. Armstrong & Brown : new hybrid *Odontoglossums*.

ORCHID COMMITTEE, FEBRUARY 24, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and eighteen members present.

Awards Recommended :—

Silver Gilt Lindley Medal.

To Monsieur Firmin Lambeau, Brussels, for a fine specimen of the remarkable *Miltonia* × *Bleuana* var. 'Reine Elisabeth.'

Silver Gilt Flora Medal.

To Messrs. Armstrong & Brown, for new and rare hybrids.

Silver Flora Medal.

To Messrs. Charlesworth, for *Odontoglossums*, *Odontiodas*, etc.

To Messrs. McBean, for *Laeliocattleyas*, etc.

To Messrs. Stuart Low, for *Cattleyas*, *Odontoglossums*, and *Odontiodas*.

Silver Flora Medal.

To Messrs. Flory & Black, for hybrids.

First-class Certificate.

To *Miltonia* × *Bleuana* var. 'Reine Elisabeth' (*M. vexillaria* × *M. Roezlii*) (votes unanimous), from Monsieur Firmin Lambeau. A very remarkable form, of large size, white, tinged with rose. Its extraordinary feature is the abnormal development of the violet blotch on the petals of *M. Roezlii* until it occupies the greater part of the surface of those segments in this hybrid. The first instance of its kind.

Award of Merit.

To *Odontoglossum* × 'Henry VIII.' (*O.* × 'Solon' × *O.* × 'Aglaon') (votes 16 for, 0 against), from W. R. Fasey, Esq. Flower claret-red with a few intersecting white lines.

To *Odontoglossum* × 'Conqueror,' Fasey's var. (*O. illustrissimum* × *O. crispum*) (votes 12 for, 2 against), from W. R. Fasey, Esq. A large white variety heavily blotched with dark reddish-purple.

Other Exhibits.

Sir Jeremiah Colman, Bt. : two specimens of *Sarcochilus* and *Coelogyne* × *gattionense*.

Baron Bruno Schröder : cut spikes of hybrids.

Pantia Ralli, Esq. : *Odontoglossum* × *eximium* var. 'Arghiro.'

Sir Mervyn E. M. Buller : *Cattleya* × 'Clotho' *splendens* (*C.* × 'Enid' × *C. Trianae*).

ORCHID COMMITTEE, MARCH 9, 1920.

Sir HARRY J. VEITCH in the Chair, and sixteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Armstrong & Brown, for hybrids, including new *Odontoglossums*.

To Messrs. Charlesworth, for a group.

To Messrs. Stuart Low, for *Cattleyas* and *Laeliocattleyas*.

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for *Cymbidiums*, etc.

To Messrs. Flory & Black, for *Odontoglossums*.

First-class Certificate.

To *Cypripedium* × 'Florence Spencer,' Chardwar var. (*C.* × *Memoria Jerminghamiae* × *C.* × *Actaeus langleyense*) (votes unanimous), from Messrs. Armstrong & Brown. Dorsal sepal white; petals and lip yellow with a slight rose shade.

To *Sophrolaeliocattleya* × 'Meuse' *magnifica* (*S.-l.-c.* × 'Marathon' × *L.-c.* × *callistoglossa*) (votes unanimous), from Messrs. McBean. A fine flower, in colour bright reddish-rose, with crimson centre to the lip.

Preliminary Commendation.

To *Odontoglossum* × 'Hymen' (*Lambardeanum* × 'Mars'), from Messrs. Armstrong & Brown. Flowers reddish-violet with slight white markings.

Cultural Commendation.

To Mr. Farnes, orchid-grower to Pantia Ralli, Esq., for a fine specimen of *Cymbidium* × *Alexanderi*, Ashted Park var.

Other Exhibits.

Baron Bruno Schröder: spikes of *Calanthe* × 'Baron Schröder.'

Dr. F. Bedford, Fulford, York: a finely coloured *Brassocattleya* × *Dietrichiana*.

Pantia Ralli, Esq.: three distinct forms of *Sophrolaeliocattleya* × 'His Majesty.'

ORCHID COMMITTEE, MARCH 23, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and twenty-one members present.

Awards Recommended:—*Silver Flora Medal.*

To Messrs. Armstrong & Brown, for new *Odontoglossums* and *Odontiodas*.

To Messrs. Charlesworth, for *Laeliocattleyas* and other hybrids.

To H. T. Pitt, Esq., for hybrids and rare species.

To Messrs. McBean, for *Odontoglossums*.

To Messrs. Stuart Low, for hybrids.

Silver Banksian Medal.

To Messrs. Flory & Black, for *Sophrocattleyas* and *Odontoglossums*.

First-class Certificate.

To *Cattleya* × *Cowaniae alba* (*C. intertexta alba* × *C. Mossiae Wageri*) (votes unanimous), from Messrs. McBean. Flowers pure white with yellow disc to the lip.

To *Odontoglossum* × 'Everest' ('Princess Mary' × 'Mirabeau Mastiff') (votes unanimous), from Messrs. McBean. Flowers of the largest, and finely formed. White, evenly blotched with dark purple.

Award of Merit.

To *Aerido-Vanda* × *Mundyi* (*V. teres* × *Aerides Vandarum*) (votes unanimous), from Sir Jeremiah Colman, Bt. Leaves terete. Habit of *V. teres*. Flowers white, resembling those of the *Aerides* parent.

To *Pleione Pricei* (votes 15 for, 0 against), from W. R. Price, Esq., Chepstow, who collected it in the Island of Formosa. (*Bot. Mag.* t. 8729.)

To *Odontioda* × 'Joan,' Warnham Court var. (*Oda.* × *Charlesworthii* × *Odm.* × *ardentissimum*) (votes 15 for, 0 against) from C. J. Lucas, Esq., Warnham Court. Colour deep red with white front to the lip.

To *Odontioda* × *Joiceyi* (*Odm.* × 'Promerens' × *Oda.* × 'Coronation') (votes 18 for, 0 against), from J. J. Joicey, Esq. Flowers nearest to *Oda.* × 'Coronation,' but larger and richly blotched with rose-purple.

Cultural Commendation.

To Messrs. McBean, for a fine specimen of *Odontoglossum* × 'Souvenir de Victor Hye de Crom.'

Other Exhibits.

Sir Jeremiah Colman, Bt.: *Brassocattleyas*.

G. W. Bird, Esq.: *Odontiodas*.

ORCHID COMMITTEE, APRIL 13, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and ten members present.

Awards Recommended :—

Silver Flora Medal.

To Sir Jeremiah Colman, Bt., for varieties of *Lycaste Skinneri*, and *Brassocattleyas*.

To H. T. Pitt, Esq., for hybrids and rare species.

To Messrs. Stuart Low, for *Laeliocattleyas*, *Odontoglossums*, and *Odontiodas*, with yellow *Oncidiums*, and scarlet *Sophronitis*.

To Messrs. Charlesworth, for hybrids.

Silver Banksian Medal.

To Messrs. Armstrong & Brown, for new *Odontoglossums*, etc.

To Messrs. Sanders, for *Cymbidiums*.

To Messrs. Flory & Black, for new and rare hybrids.

To Mr. Harry Dixon, Wandsworth Common, for a group.

To Messrs. McBean, for fine *Odontoglossums* and scarlet *Oncidioda* × *Cooksoniae*.

First-class Certificate.

To *Brassocattleya* × 'Gatton Lily' var. 'Triumph' (*B.-c.* × *Digbyano-Mendelii* × *C. Trianae albens*) (votes unanimous), from Sir Jeremiah Colman, Bt. A noble pure-white flower with pale-yellow disc to the lip.

Award of Merit.

To *Odontoglossum* × 'Joy' (*O. Uro-Skinneri* × *O. eximium*) (votes 7 for, 2 against), from C. J. Lucas, Esq. Flowers white, densely spotted with purple, and showing much of *O. Uro-Skinneri*.

To *Odontioda* × 'Léon Perrin' (*Oda.* × *Sanderae* × *Odm. eximium*) (votes unanimous), from Messrs. Flory & Black. *Odontoglossum*-like in size and form; deep red with lighter margins.

To *Laeliocattleya* × 'Eunice' var. 'Snowdon' (*C. chocoensis alba* × *L. anceps alba*) (votes unanimous), from Messrs. McBean. Flowers on tall spike, large and pure white.

Cultural Commendation.

To Mr. H. Haddon, orchid-grower to Mrs. Bischoffsheim, Stanmore, for a finely-flowered *Dendrobium Brymerianum* with twenty-two spikes.

Other Exhibits.

Sir H. S. Leon, Bart., Bletchley Park: *Cymbidium* × *Cooperi* nat. hyb., now known to be identical with the home-raised *C.* × 'J. Davis' (*insigne* × *Schroederianum*).

Dr. Miguel Lacroze: new *Odontoglossums*.

R. G. Thwaites, Esq., Streatham Hill: *Odontiodas* and *Odontoglossums*.

ORCHID COMMITTEE, APRIL 27, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and eighteen members present.

Awards Recommended :—

Silver Flora Medal.

To H. T. Pitt, Esq., for a group.

To Messrs. Charlesworth, for *Odontoglossums*, *Odontiodas*, and *Laeliocattleyas*.

To Messrs. McBean, for *Odontoglossums*, *Cattleyas*, etc.

Silver Banksian Medal.

To Messrs. Armstrong & Brown, for new *Odontiodas*, etc.

To Mr. H. Dixon, Wandsworth Common, for fine specimens of *Vanda Parishii*, *Marriottiana*, and other species.

To Messrs. Sanders, St. Albans, for hybrids and Coelogynes.
To Messrs. Flory & Black, for hybrids.

Award of Merit.

To *Odontoglossum* × 'Adula' (*O. eximium* × *O.* × 'Doris') (votes unanimously), from Pantia Ralli, Esq. Flower reddish-purple with blush-white margins and tips.

To *Cattleya* × 'Tityus,' Fasey's var. ('Enid' × 'Octave Doin') (votes 12 for, 4 against), from W. R. Fasey, Esq. Flowers large, rose colour with purple front to the lip.

To *Odontoglossum* × 'Bonaparte' ('Aglaon' × *percultum*) (votes 16 for), from W. R. Fasey, Esq. Flower white, showily blotched with purplish-crimson.

To *Odontoglossum* 'Fabia,' Frant Court var. (*O. eximium* × *O.* × 'Aglaon') (votes 12 for, 4 against), from B. H. Smith, Esq., Frant Court, Sussex. Flower large, white blotched with claret-purple.

To *Brassolaeliocattleya* × 'Joan' var. 'Excelsior' (*C.* × 'Octave Doin' × *B.-l.* × 'Mary Gratrix') (votes 16 for, 0 against), from Messrs. Charlesworth, Haywards Heath. Flower of good form, yellow, with slightly fringed lip.

To *Odontioda* × 'Decia' (*Oda.* × *Charlesworthii* × *Odm.* × 'Mars') (votes 12 for, 2 against), from Messrs. Armstrong & Brown). A large flower of uniform bronzy claret colour.

To *Odontoglossum* × 'Diamond' ('King Arthur' × *eximium*) (votes 15 for, 0 against), from Messrs. McBean. Flowers large and broadly proportioned, white, densely blotched with dark mauve.

Other Exhibits.

Baron Bruno Schröder: *Odontoglossum crispum* 'Leonard Perfect,' and *apiatum*, in fine condition.

Dr. Miguel Lacroze: *Sophrolaeliocattleya* × 'Entre Rios' (*S.-l.-c.* × 'Marathon' × *L.-c.* × 'St. Gothard') and other hybrids.

C. J. Lucas, Esq.: *Odontoglossum* × 'Thetis.'

B. H. Smith, Esq.: *Odontoglossums*.

G. W. Bird, Esq.: *Odontiodas*.

Messrs. Stuart Low: *Laeliocattleya* × Ferschro' (*L.-c.* × 'Feronia' × *C. Schroederiae*).

T. P. Wren, Esq., Northampton: *Odontoglossum* × 'St. George.'

ORCHID COMMITTEE, MAY II, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and eighteen members present.

Awards Recommended:—

Silver Flora Medal.

To E. R. Ashton, Esq., Broadlands, Tunbridge Wells, for *Odontoglossums* and *Odontiodas*.

To H. T. Pitt, Esq., for hybrids and rare species.

To Messrs. Charlesworth, for hybrid *Miltonias*.

To Messrs. Armstrong & Brown, for *Odontoglossums*, *Odontiodas*, and *Miltonias*.

Silver Banksian Medal.

To Pantia Ralli, Esq., for hybrid *Odontoglossums*.

To Messrs. Sanders, for hybrids and species.

Award of Merit.

To *Odontoglossum* × *Fabia*, Ralli's var. (*eximium* × 'Aglaon') (votes 16 for, 0 against), from Pantia Ralli, Esq. Flower large and of fine form, claret-red, with slight white markings and margin.

To *Odontioda* × 'Gloss,' Broadlands var. (*Oda.* × *Charlesworthii* × *Odm. triumphans*) (votes 9 for, 1 against), from E. R. Ashton, Esq., a distinct variety of a peculiar bronzy orange-red colour with shining surface.

To *Cattleya* × 'Snowflake' var. 'Noel' (*Dusseldorfei* 'Undine' × *labiata alba*) (votes 16 for, 0 against), from Sir Herbert S. Leon, Bt. Resembling *C. labiata alba*, and of a clear white, with pale-yellow disc to the lip.

Other Exhibits.

Sir Herbert S. Leon : *Laeliocattleya* × 'Sir David Beatty.'

Pantia Ralli, Esq. : *Odontoglossums*.

R. G. Thwaites, Esq. : *Laeliocattleya* × 'Douros.'

ORCHID COMMITTEE, JUNE 1, 2, 3.

CHELSEA SHOW.

Sir HARRY J. VEITCH in the Chair, and eighteen members present.

Awards Recommended :—

First-class Certificate.

To *Odontioda* × 'Gatton Glory' (*Odm.* × 'King George V.,' × *Oda.* × *Colmaniae*) (votes unanimous), from Sir Jeremiah Colman, Bt. (gr. Mr. J. Collier). Flower large and *Odontoglossum*-like. Colour canary-yellow with red blotches on the inner halves of the segments.

To *Odontonia* × 'Gladys' (*M.* × *Bleuana* × *Odm.* × *eximium*) (votes 15 for), from Messrs. Charlesworth. A pretty representative of a new section, four different crosses of which were shown. Flowers flatly arranged and with the *Miltonia* shape. Ground colour pink or white, heavily blotched with dark violet.

Award of Merit.

To *Orchis foliosa* (votes unanimous), from Mrs. Evelyn Holden, Goldwell, Newbury. The fine Madeira plant. The specimen bore eight stout spikes, densely clad with rosy-mauve flowers. (*Bot. Mag.* 5074.)

To *Odontoglossum* × 'St. George' var. 'Albion' (*O. eximium* × *O. Alexandrina*) (votes 15 for, 0 against), from Messrs. Charlesworth. Flower rich claret colour with white margin.

To *Odontoglossum* × *crispo-Solon* 'Kenneth' (*crispum* × 'Solon') (votes 11 for, 3 against), from Messrs. Charlesworth. Flower of good shape, reddish-purple with the white ground showing between the blotches of colour.

To *Miltonia* × 'Memoria Crown Princess Margaret' (parentage unrecorded) (votes 8 for, 1 against), from Messrs. Sanders. Of the *M.* × *Hyeana* class. Flowers white, with a slight rose tint and broad blackish mask at the base of the lip.

Preliminary Commendation.

To *Odontonia* × 'Dora' (*M.* × *Bleuana* × *Odm.* × 'Dora'), from Messrs. Charlesworth. Flowers bright mauve and white.

Cultural Commendation.

To Mrs. E. Holden, Newbury, for *Orchis foliosa*.

ORCHID COMMITTEE, JUNE 15, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and twelve members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Charlesworth, for white Cattleyas, *Odontoglossums*, and *Odontiodas* with some interesting species.

First-class Certificate.

To *Laeliocattleya* × 'Mrs. Willoughby Pemberton' ('Baroness Emma' × *eximia*) (votes unanimous), from Baron Bruno Schröder. A great improvement on *L.-c.* × 'Baroness Emma' (*C.* × *Hardyana* × *L.-c.* × *eximia*), and in colour and form more nearly approaching *L.-c.* × *eximia*. Flower eight and a half

inches across. Sepals and petals silver white, tinged with rose; lip ruby-purple with yellow centre.

Other Exhibits.

W. R. Fasey, Esq.: *Odontoglossum* × *Fabia majestica*.

Messrs. Sanders: *Odontoglossum crispum* var. *belgicum*.

ORCHID COMMITTEE, JUNE 29, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and eleven members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Charlesworth, for hybrid Miltonias, Odontiodas, and Odontoglossums.

First-class Certificate.

To *Laeliocattleya* × 'San Juan,' The Dell var. (*L.-c.* × 'Aphrodite' × *C. Mendelii*) (votes unanimous), from Baron Bruno Schröder. A showy hybrid with flowers over eight inches across. Sepals and petals light rose; lip bright ruby-purple with gold lines from the base.

To *Odontoglossum* × 'Victory' var. 'Supreme' (*crispum* × 'Dreadnought') (votes unanimous), from Messrs. Armstrong & Brown. Flower four and a half inches across and with equally broad segments. Inner two-thirds of the segments purplish-red, margins white.

To *Miltoniodes* × *Harwoodii* 'Excelsior' (*Cochlidium Noezliana* × *Miltonia vexillaria*), (votes unanimous), from Messrs. Charlesworth. Inflorescence erect, bearing nine flowers. Sepals and petals rosy-red; lip rose with yellow crest.

Award of Merit.

To *Odontioda* × 'Dauntless,' 'Blue Bird' (*Oda.* × 'Coronation' × *Odm.* × *Armstrongiae*) (votes 9 for, 1 against), from Messrs. Armstrong & Brown. A finely shaped ruby-red flower with a few white markings.

Cultural Commendation.

To Messrs. Charlesworth, for *Miltoniodes* × *Harwoodii* 'Excelsior.'

Other Exhibits.

Sir Jeremiah Colman, Bt.: the yellow *Sobralia Colmaniae*.

ORCHID COMMITTEE, JULY 13, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and ten members present.

Awards Recommended:—

Award of Merit.

To *Cattleya* × 'Hesperus' (*Hardyana* × 'Enid') (votes 8 for), from Baron B. Schröder. Flower seven inches across. Sepals and petals silver-white tinged and veined with rosy-mauve; lip broad, claret-red with yellow disc.

To *Odontoglossum* × 'Eldorado' (*eximium* × *Lakiniæ*) (votes unanimous), from W. R. Fasey, Esq. A fine white flower prettily blotched with violet-purple. Petals four and a half inches across.

To *Vuylstekeara* × *Brewii* (*Oda.* × *Brewii* × *Miltonia vexillaria*) (votes 7 for, 1 against), from Messrs. Charlesworth. The shape is much influenced by the *Miltonia* parent. Sepals and petals dark ruby-red; lip white tinged and veined with mauve.

To *Odontonia* × *Bedfordiae* (*Odm.* × *amabile* × *M.* × *Bleuana*) (votes 6 for, 1 against), from Messrs. Charlesworth. An interesting cross of quite intermediate characters. Sepals and petals ovate-acuminate white, marked with violet at the base; lip white with radiating spotted lines of purple at the upper half.

Other Exhibits.

H. T. Pitt, Esq. : *Bulbophyllum macrobulbon* 'J. J. Smith' (*B. Balfourianum* Hort.) and other species.

Baron Bruno Schröder : *Sophrolaeliocattleya* × 'Faboris.'

G. W. Bird, Esq. : *Odontiodas*.

Messrs. Flory & Black : *Disa* × 'Italia' and *Odontoglossums*.

ORCHID COMMITTEE, JULY 27, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and sixteen members present.

Awards Recommended :—

Award of Merit.

To *Sophrolaeliocattleya* × 'Laura' ('Pandora' × 'Marathon') (votes unanimous), from Messrs. Charlesworth. In effect a medium-size *Laeliocattleya* with deep-mauve flowers, having a ruby-red lip with gold lines from the base.

Other Exhibits.

Baron Bruno Schröder : *Cattleya* × 'Eleanor,' The Dell var.

Dr. Miguel Lacroze : *Odontioda* × *Brewii* var. 'Negra.'

Messrs. Sanders : *Laeliocattleyas*.

Messrs. Charlesworth : *Odontioda* × *illustris*.

Messrs. McBean : *Odontoglossum* × *Fletcherianum* (*Edwardii* × *cirrhosum*).

W. R. Fasey, Esq. : *Odontoglossum* × 'St. George,' Fasey's variety.

ORCHID COMMITTEE, AUGUST 10, 1920.

Sir HARRY J. VEITCH in the Chair, and seven members present.

Awards Recommended :—

Award of Merit.

To *Vuykstekeara* × 'Mrs. Pitt' (*Odontonia* × 'Laelia Sander' × *Oda.* × *Charlesworthii*) (votes 5 for, 0 against), from H. T. Pitt, Esq. Flower *Odontoglossum*-like and of good shape. Sepals and petals vinous purple with thin yellow margin; lip cream-white with purple blotches.

To *Laeliocattleya* × 'Bombardier' (*C.* × 'Adula' × *L.-c.* × 'Geo. Woodhams') (votes unanimous), from W. R. Fasey, Esq. Intermediate between the two parents. Sepals and petals rosy-mauve; lip Tyrian purple with yellow lines from the base to the centre, on each side of which there is a yellow blotch.

To *Cattleya* × 'Diana' *majestica* (*Dowiana* × 'Sybil' var. 'Lord Kitchener') (votes 6 for, 1 against), from Messrs. Hassall. A second crossing with *C. Dowiana* has resulted in a close approach to that species in size and form. Sepals and petals canary-yellow; lip crimped and fringed, bright purple with yellow disc.

Vote of Thanks.

To H. T. Pitt, Esq., Rosslyn (gr. Mr. Thurgood), for an interesting collection of rare and curious species.

ORCHID COMMITTEE, AUGUST 24, 1920.

Sir HARRY J. VEITCH in the Chair, and nine members present.

Awards Recommended :—

Silver Flora Medal.

To His Grace the Duke of Marlborough (gr. Mr. Barker), for hybrids raised at Blenheim.

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for hybrids and species.

First-class Certificate.

To *Cattleya* × 'Heliodor' (*iridescens* × 'Venus') (votes 7 for, 1 against), from Baron Bruno Schröder. A remarkably showy hybrid, having in its composition *C. bicolor*, *C. Dowiana*, *C. Eldorado*, and *C. × Iris*. The sepals and petals are clear chrome-yellow; the elongated lip orange colour with bright-purple front lobe.

Award of Merit.

To *Brassolaeliocattleya* × 'Blenheim Orange' (*B.-l.-c.* × 'Rowena' × *C. Dowiana aurea*) (votes unanimous), from the Duke of Marlborough. Flower of fine substance, orange colour with cherry-red front to the lip.

To *Cattleya* × *triumphans*, Blenheim var. (*Rex* × *Dowiana aurea*) (votes 7 for, 0 against), from the Duke of Marlborough. Flower formed like *C. Dowiana*, cowslip-yellow with purplish-red front to the lip, which has gold lines from the base.

To *Odontoglossum* × 'Miguelito,' Fasey's var. ('Doris' × 'Dora') (votes 6 for, 1 against), from W. R. Fasey, Esq. Flower large, heavily blotched with purple, the outer parts of the segments lilac.

Other Exhibits.

Pantia Ralli, Esq.: *Cattleya* × *Hardyana alba*.

W. Waters Butler, Esq., Edgbaston: *Laeliocattleya* × *Butleri* (*L.-c.* × 'G. G. Whitelegge' × *C. × Hardyana*).

H. T. Pitt, Esq.: *Laeliocattleya* × 'Cambrai.'

W. R. Fasey, Esq.: *Odontoglossums*.

A. J. Hollington, Esq., Enfield: *Laeliocattleyas*.

Messrs. McBean: *Odontoglossum crispum* 'Challenger.'

ORCHID COMMITTEE, SEPTEMBER 7, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen members present.

Awards Recommended:*Silver-gilt Flora Medal.*

To His Grace the Duke of Marlborough, for *Cattleyas* and *Laeliocattleyas* raised at Blenheim.

Silver Flora Medal.

To Messrs. Armstrong & Brown, for hybrids.

To Messrs. Charlesworth, for *Odontoglossums*, *Odontiodas*, and *Laeliocattleyas*.

To Messrs. Stuart Low, for *Laeliocattleyas* and *Brassocattleyas*.

Silver Banksian Medal.

To H. T. Pitt, Esq., for rare species, including *Laelia monophylla* with seven-teen flowers.

To Messrs. McBean, Cooksbridge, for a group.

First-class Certificate.

To *Brassocattleya* × 'Ilene' var. *grandis* (*B.-c.* × 'Madame Chas. Maron' × *C. Dowiana aurea*) (votes unanimous), from Messrs. Stuart Low. An enormous flower of light-lilac colour with yellow disc to the fringed lip.

Award of Merit.

To *Brassocattleya* × 'Maroniris' var. 'Canary' (*B.-c.* × 'Madame Chas. Maron' × *C. × Iris*) (votes 11 for, 0 against), from the Duke of Marlborough. Flower of fine shape, canary-yellow, the front of the lip rose-pink.

To *Cattleya* × *Abekeniae* (*Dowiana* × 'Lord Rothschild') (votes 11 for, 0 against), from W. R. Fasey, Esq. Flower resembling *C.* × 'Lord Rothschild,' but yellow in colour and with orange disc to the purple-fronted lip.

To *Brassocattleya* × 'Lisette' (*B.-c.* × *Digbyano-Warneri* × *C. Dowiana aurea*) votes 11 for, 0 against), from W. R. Fasey, Esq. Flower violet-purple with pale-yellow base and centre to the lip.

Cultural Commendation.

To Messrs. Armstrong & Brown, for *Cattleya Iris majestica*, with two spikes of seven and six flowers.

Vote of Thanks.

To Messrs. Sanders, St. Albans, for hybrids and species.

Other Exhibits.

Mrs. Bischoffsheim : several distinct forms of *Cattleya* × 'Sybil,' and *C.* × 'Van Houtte.'

Pantia Ralli, Esq., Ashted Park : hybrids.

W. R. Fasey, Esq. : *Odontoglossums*.

ORCHID COMMITTEE, SEPTEMBER 21, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Armstrong & Brown, Tunbridge Wells, for hybrid Orchids with some rare species.

Silver Flora Medal.

To Messrs. Stuart Low, for Cattleyas, Brassocattleyas, and other hybrids.

Silver Banksian Medal.

To Messrs. Flory & Black, for new hybrids.

To Messrs. Sanders, for a group.

First-class Certificate.

To *Brassolaeliocattleya* × 'Amber' (*B.-l.-c.* × 'The Baroness' × *C. Dowiana aurea*) (votes unanimous), from Baron Bruno Schröder. Flower large and of perfect shape ; amber-yellow, with rose-purple freckling on the front of the lip.

Award of Merit.

To *Brassolaeliocattleya* × 'Tucuman,' Fasey's variety (*B.-l.-c.* × *Cooksonii* × *C.* × 'Rhoda') (votes 12 for, 0 against), from W. R. Fasey, Esq. Equal in size to *Cattleya Dowiana*, but with narrower lip. Sepals and petals orange-yellow, lip bright crimson.

To *Laeliocattleya* × 'Grand Monarch' (*L.-c.* × 'Nella' × *C. Trianae* 'Grand Monarch') (votes 11 for, 0 against), from Messrs. Flory & Black. Sepals and petals broad, silver-white tinged with mauve ; lip Tyrian purple with whitish lines from the base.

To *Cattleya* × 'Royal Purple' ('Alexandra' × 'Empress Frederick') (votes 10 for, 0 against), from Messrs. Flory & Black. Sepals and petals mauve with white freckling ; lip dark purple.

To *Brassocattleya* × 'Olympus' var. 'Nena' (*B.-c.* × 'Madame Chas. Maron' × *C.* × *Hardyana*) (votes 11 for, 1 against), from Messrs. Flory & Black. A large and finely formed flower, cream-white tinged with rose.

Other Exhibits.

Dr. Miguel Lacroze : *Laeliocattleyas*.

A. J. Hollington, Esq. : Cattleyas and cut flowers of hybrids.

Messrs. Charlesworth : Cattleyas and *Laeliocattleyas*.

ORCHID COMMITTEE, OCTOBER 5, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and seventeen members present.

Awards Recommended :—*First-class Certificate.*

To *Brassolaeliocattleya* × 'Muriel' *magnifica* (B.-c. × 'Madame Chas. Maron' × L.-c. × 'Feronia') (votes unanimous), from W. R. Fasey, Esq. Flower large and of fine substance, rose-pink with purple front to the fringed lip, which has a large chrome-yellow disc.

To *Vuykstekeara* × 'Memoria Joseph Charlesworth' (*Odontioda* × *Brewii* × *Miltonia* × *Charlesworthii*) (votes unanimous), from Messrs. Charlesworth. Flower partaking most of the *Miltonia* parent, but smaller. Sepals and petals deep maroon-crimson; lip broadly ovate rosy-crimson with yellow crest.

Award of Merit.

To *Odontoglossum* × 'Dusky Queen' ('Jasper' × 'Aquitania') (votes 12 for, 3 against), from W. R. Fasey, Esq. Flower large, white, densely blotched with reddish-purple.

To *Odontoglossum* × 'Sir Harry Veitch' ('Mars' × 'Menier St. Vincent') (votes unanimous), from Messrs. Armstrong & Brown. A richly-coloured seedling flowering for the first time. Sepals and petals bright purplish-crimson with small pure white bases and tips; lip white in front, dark crimson at base; crest yellow.

To *Odontoglossum* × 'Mrs. Jas. Wood' ('Rex' × *crispum* 'Perfection') (votes 12 for, 1 against), from Messrs. Armstrong & Brown. A large and well-formed white flower, heavily blotched with dark red.

To *Cattleya* × 'Mira' var. 'The Prince' ('Rhoda' × *Dowiana aurea*) (votes 12 for, 1 against), from Messrs. Flory & Black, Slough. Sepals and petals bright yellow with a slight rose shade; lip crimson with yellow base.

To *Brassocattleya* × 'Rosita' var. 'Harmony' (B.-c. × 'Ilene' × *C. Dowiana aurea*) (votes 11 for, 0 against), from Messrs. Flory & Black. Flower cream-white with purplish front to the fringed lip, the disc of which is bright yellow.

Preliminary Commendation.

To Pantia Ralli, Esq., Ashted Park, for *Odontoglossum* × 'Emma' (*ash-teadense* × *eximium*). Flowers reddish-claret with white front to the lip.

Other Exhibits.

The Duke of Marlborough: *Laeliocattleyas*.

Sir Herbert S. Leon, Bt.: hybrids and species of *Dendrobium*.

Baron Bruno Schröder: *Laeliocattleya* × 'Ivanhoe.'

W. R. Fasey, Esq.: *Brassocattleya* × 'Lemon.'

Messrs. Sanders: *Miltonia* × 'Redbreast.'

Messrs. Charlesworth: *Miltonia* hybrids.

ORCHID COMMITTEE, OCTOBER 19, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Odontoglossums*, *Laeliocattleyas*, and other hybrids.

Silver Flora Medal.

To H. T. Pitt, Esq., for hybrids, including the handsome *Odontoglossum* × 'Lady Veitch,' and rare species.

To Messrs. Charlesworth, for new *Cattleyas*.

To Messrs. Stuart Low, for *Cattleyas*, *Laeliocattleyas*, and *Cypripediums*.

To Messrs. Sanders, for *Cattleya* × *Fabia alba* and other whites.
To Messrs. McBean, for Cymbidiums, Laeliocattleyas, and other hybrids.

First-class Certificate.

To *Laeliocattleya* × 'Ivanhoe' *superba* (*C. Dowiana aurea* × *L.-c.* × *eximia*) (votes 10 for, 2 against), from Baron Bruno Schröder. Sepals and petals rosy-mauve; lip broad, ruby-purple with gold lines from the base.

To *Vanda coerulea* 'King of the Blues' (votes unanimous), from Pantia Ralli, Esq. The plant bore a fine spike of large circular flowers of a deep sky-blue colour.

Award of Merit.

To *Sophrolaeliocattleya* × 'Camden' (*L.-c.* × 'Oakwood Alpha' × *S.-c.* × 'Doris') (votes unanimous), from E. R. Ashton, Esq., Camden Park, Tunbridge Wells. A charming hybrid in which the yellow colours of some of the parents predominate. Flowers rich orange-chrome yellow, darker on the lip, which has a narrow red band in front.

To *Cypripedium* × 'Frontline' (*Mirum* × *Leeanum*) (votes 10 for, 0 against), from W. R. Fasey, Esq. Dorsal sepal large, white blotches with purple. Lip and petals honey-yellow tinged purple.

To *Cattleya* × 'Dolorosa' (parentage unrecorded) (votes 9 for, 3 against), from W. R. Fasey, Esq. Flowers pale yellow with claret lip.

To *Cattleya* × 'Troilus' (*Luegeae* × 'Clotho') (votes unanimous). Flower large and finely formed, light mauve with violet-purple lip. From Messrs. Charlesworth.

To *Brassocattleya* × 'Sofrano' (*B.-c.* × 'Mrs. J. Leemann' × *C.* × *irides-cens*) (votes 13 for, 0 against), from Messrs. Charlesworth. Flower sulphur-yellow, with rose shade on the front of the lip, which is slightly fringed.

Cultural Commendation.

To Otto Beit, Esq.: *Vanda coerulea*.

Other Exhibits.

Pantia Ralli, Esq.: *Brassolaeliocattleya* × *citrina* (*C. citrina* × *B.-l.* × *Jessopii*).

R. G. Thwaites, Esq.: *Odontoglossum* × *autumnale* (*crispum* × *swietenicolor* and white Cattleyas).

J. J. Joicey, Esq.: *Brassocattleyas*.

Dr. Miguel Lacroze hybrid *Odontoglossums*.

Baron Bruno Schröder: *Laeliocattleyas*.

Mrs. Bischoffsheim: *Cattleya* × 'Sybil.'

ORCHID COMMITTEE, NOVEMBER 2, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and thirteen members present.

Awards Recommended:—

Gold Medal.

To Sir Jeremiah Colman, Bt., for a fine group of hybrids, chiefly raised at Gatton, and interesting rare species.

To Messrs. Charlesworth, for Cattleyas, Laeliocattleyas, and *Odontoglossums*.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvisbrook, for hybrids.

To Messrs. Sanders, for *Cattleya Fabia alba*.

First-class Certificate.

To *Odontioda* × *cardinalis* (*Oda.* × *Schroederiana* × *Odm.* × *eximium*) (votes unanimous), from Messrs. Charlesworth. A fine flower, over four inches across, scarlet crimson. The tips and margins of the segments white, tinged with lilac.

Award of Merit.

To *Cattleya* × 'Mérope,' The Dell var. (*Fabia* × *Trilanae*) (votes 12 for, 1 against), from Baron Bruno Schröder. Flowers large and of good shape, pure white, with Tyrian purple front to the lip.

To *Brassocattleya* × 'Wm. Pitt' (*C.* × 'Octave Doin' × *B.-c.* × *Digbyano-Warneri*) (votes 10 for, 1 against), from H. T. Pitt, Esq., Stamford Hill. Sepals and petals rose-pink; lip darker and with chrome-yellow centre.

To *Cattleya* × 'Picotee' (*Hardyana* × 'Octave Doin') (votes unanimous) from W. R. Fasey, Esq. Sepals and petals white flaked with lilac. Lip large, ruby-crimson, with numerous yellow lines at the base.

Other Exhibits.

Sir Jeremiah Colman, Bt.: *Brassolaeliocattleya* × 'Antoinette' varieties.

Baron Bruno Schröder: *Brassolaeliocattleya* × *maculata*.

W. R. Fasey, Esq.: *Cattleya* × 'Enid' *alba*.

R. G. Thwaites, Esq.: varieties of *Cattleya* × 'Bellona.'

ORCHID COMMITTEE, NOVEMBER 16, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and sixteen members present.

On the motion of Mr. McBean, the Committee resolved that in future the number of flowers borne on a plant certificated should be recorded on the back of the picture.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Stuart Low, for hybrid *Cattleyas*, *Brassocattleyas*, and *Odontoglossums*.

Silver Banksian Medal.

To Messrs. McBean, Cooksbridge, for hybrids and *Cymbidiums*.

To Messrs. Sanders, for white-petalled *Cattleyas*.

First-class Certificate.

To *Odontoglossum* × 'St. George,' Ralli's var. (*eximium* × *Alexandrina*). (votes 9 for, 0 against), from Pantia Ralli, Esq. A large and perfectly-formed flower, two-thirds of the white ground being taken up by large violet blotches.

Award of Merit.

To *Brassolaeliocattleya* × 'The Baroness,' Fasey's var. (*B.-c.* × 'Mrs. J. Leemann' × *L.-c.* × 'Ophir') (votes unanimous), from W. R. Fasey, Esq. A good light-yellow flower, with slight rose band inside the fringed margin of the lip.

To *Laeliocattleya* × *fulva* (*L.-c.* × 'Golden Oriole' × *C.* × *fulvescens*) (votes 11 for, 3 against), from Lt.-Col. Sir Geo. L. Holford, Westonbirt. Flower large, bright chrome-yellow; lip tinged and blotched with purple.

To *Laeliocattleya* × 'Momus,' Bryndir variety (*L.-c.* × *rubens* × *C.* × 'Octave Doin') (votes 14 for, 0 against), from Dr. Miguel Lacroze, Bryndir, Roehampton. Flower large, on small-growing plant; rose, with claret-red lip with yellow disc and lines from the base to the centre.

To *Odontoglossum* × 'Red Admiral' (*eximium* × *Lambardeanum*) (votes 12 for, 0 against), from W. R. Fasey, Esq. Flower large, white tinged with lilac and blotched with purple, the central blotch on the petals bearing an ovate white patch.

Other Exhibits.

Sir Geo. L. Holford: *Cypripedium* × 'Nydia.'

Baron Bruno Schröder: three forms of *Laeliocattleya* × *Schroederiae*.

Sir Jeremiah Colman, Bt.: hybrids and species.

Sir Herbert S. Leon: *Cattleyas* and *Laeliocattleyas*.

H. T. Pitt, Esq.: *Odontoglossums*.

W. R. Fasey, Esq.: *Odontoglossums* and *Odontiodas*.

Pantia Ralli, Esq.: *Laeliocattleya* × *Schroederiae*.

Mr. H. Dixon: *Odontoglossum* × *eximium* *Xanthotes*.

ORCHID COMMITTEE, NOVEMBER 30, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and nineteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. Stuart Low, for hybrids, with *Oncidium varicosum* and other species.

Silver Flora Medal.

To Messrs. Armstrong & Brown, for *Odontoglossums*, *Odontiodas*, and *Cypripediums*.

To Messrs. Charlesworth, for *Cattleyas*, *Laeliocattleyas*, and other hybrids.

Silver Banksian Medal.

To Messrs. Sanders, for white *Cattleyas*, *Cypripediums*, and *Odontoglossums*.

First-class Certificate.

To *Odontioda* × 'Juno,' Pitt's variety (*Oda.* × 'Coronation' × *Odm.* × *eximillus*) (votes 16 for, 0 against), from H. T. Pitt, Esq. Colour bright ruby-red with slight white margin, and white front to the lip.

To *Cypripedium* × 'Forest King' ('Desdemona' × *Beekmannii*) (votes 19 for, 0 against), from H. T. Pitt, Esq. Flower large. Colour greenish-yellow with spotted lines of chocolate on the dorsal sepal, which is white on the upper half.

To *Cypripedium* × 'Memoria F. M. Ogilvie,' Chardwar variety (*Curtmanni* × 'Pyramus') (votes unanimous), from Messrs. Armstrong & Brown. Dorsal sepal white with rosy-mauve middle. Petals and lip yellow, tinged and spotted with chocolate-red.

Award of Merit.

To *Cypripedium* × 'Warrior' ('Alcibiades' × 'Lord Wolmer') (votes 15 for, 0 against), from Messrs. Sanders. A very large and finely-formed flower. Dorsal sepal white with dark claret-spotted lines. Petals and lip honey-yellow, the upper halves of the petals tinged dark purple, the lower parts being spotted with the same colour.

To *Cypripedium* × 'Bacchus' ('Nydia' × 'Caractacus') (votes 13 for, 0 against), from Sir Geo. L. Holford, Westonbirt. Dorsal sepal white tinged with rose-pink. Petals and lip greenish-yellow, tinged purple.

To *Odontoglossum* × 'Rosina' *magnificum* (*eximium* × 'Lady Pirrie') (votes 16 for, 0 against), from W. R. Fasey, Esq. Flower bright-claret colour, with white margin and transverse lines.

To *Brassolaeliocattleya* × 'Cissie' (*L.-c.* × 'Myra' × *B.-c.* × 'Mrs. J. Leemann') (votes 19 for, 0 against), from Messrs. McBean. Flower bright chrome-yellow; with slight rose markings on the front of the lip.

To *Sophrolaeliocattleya* × 'Forma' (*S.-l.-c.* × 'Niobe' × *L.-c.* × *Haroldiana*) (votes 12 for, 2 against), from A. J. Hollington, Esq., Forty Hill, Enfield. Sepals and petals rosy-mauve; lip ruby-red.

Other Exhibits.

Sir Geo. L. Holford : *Cypripediums*.

E. R. Ashton, Esq. : *Odontoglossums*.

Baron Bruno Schröder : *Laeliocattleya* × *Schroederae*, seven flowers.

Messrs. Flory & Black : hybrids.

W. R. Fasey, Esq. : *Odontoglossums*.

ORCHID COMMITTEE, DECEMBER 14, 1920.

Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen members present.

Awards Recommended :—

Gold Medal.

To Baron Bruno Schröder, for a finely-arranged group of varieties of *Laeliocattleya* × *Schroederae*, bearing together about 400 flowers, and all raised from the same seed capsule.

Silver Lindley Medal.

To Mr. J. E. Shill, grower to Baron Schröder, for excellent cultivation of *Laeliocattleyas*.

First-class Certificate.

To *Laeliocattleya* × *Schroederae gloriosa* (C. × 'Maggie Raphael' *alba* × L.-c. × 'Bella' *alba*) (votes unanimous), from Baron Bruno Schröder. A fine flower with white sepals and petals, but differing from other varieties in having the lip entirely dark Tyrian purple.

Award of Merit.

To *Odontoglossum* × *ardentdora* (*ardentissimum* × 'Dora') (votes 10 for, 0 against), from W. R. Fasey, Esq. Flower large and of fine substance; white, heavily blotched with claret-red, the broad lip showing the *O. Pescatorei* in *O. ardentissimum*.

To *Cypripedium* × 'Memoria F. M. Ogilvie' 'Excelsior' (*Curtmanni* × *Pyramus*) (votes 9 for, 2 against), from Messrs. Sanders. Dorsal sepal, white with large maroon blotches. Petals and lip yellow tinged and spotted chocolate-red.

Other Exhibits.

W. R. Fasey, Esq.: *Cypripedium* × 'Georgius Rex.'

Messrs. Armstrong & Brown: *Odontoglossum* × 'Magnum,' nineteen flowers.

Messrs. Sanders: hybrids.

Messrs. McBean: *Sophrolaeliocattleya* × 'Rosalind.'

NARCISSUS AND TULIP COMMITTEE.

FEBRUARY 10, 1920.

Mr. E. A. BOWLES in the Chair, and fifteen members present.

No exhibits were before the Committee.

The members agreed to recommend the Council: "To invite Mr. J. K. Ramsbottom to give a lecture on 'Further Investigations in Daffodil Disease,' during the evening of April 13, at the close of the Daffodil Show, and that the members of the Horticultural Club be invited to attend."

NARCISSUS AND TULIP COMMITTEE, FEBRUARY 24, 1920.

Mr. E. A. BOWLES in the Chair, and fourteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Bath, Wisbech, for Daffodils and Tulips grown in fibre, in bowls, and cut Daffodils.

Mr. C. A. Jardine's seedling Daffodils exhibited for the purpose of illustrating his method of curing eelworm infestation was referred to the Scientific Committee.

NARCISSUS AND TULIP COMMITTEE, MARCH 9, 1920.

Mr. E. A. BOWLES in the Chair, and twenty-four members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for forced bulbs.

Silver-gilt Flora Medal.

To Messrs. Barr, Covent Garden, for cut Daffodils.

Silver-gilt Banksian Medal.

To Messrs. Bath, for Tulips grown in fibre, and cut Daffodils.

Award of Merit.

To Narcissus 'Magnificence' (votes unanimous), a fine, large-flowered Trumpet variety of deep golden-yellow colour. Although somewhat like 'King Alfred' it differs from that variety by coming into flower fourteen days before 'Golden Spur' when the two are grown under similar conditions. It was in bloom out-of-doors at Newcastle, Co. Down, on February 17; from the Donard Nursery Co.

To Narcissus 'Mrs. Leonard Harrison' (votes unanimous), for the rock garden. This charming Daffodil is the result of crossing *Narcissus Jonquilla* with *N. triandrus albus*; the pale sulphur-yellow flowers are drooping, on stems about 1 ft. high; very free-flowering. From L. F. Harrison, Esq., Orchards, East Grinstead.

To *Narcissus triandrus calathinus* (votes 13 for, 3 against), as an exhibition flower. This old variety was well shown, in a pot, and its cream-white, pendulous flowers were greatly admired. A *Botanical Certificate* was awarded in 1877. From the Rev. G. H. Engleheart, V.M.H., Dinton.

NARCISSUS AND TULIP COMMITTEE, MARCH 23, 1920.

Mr. E. A. BOWLES in the Chair, and eighteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Barr, for Daffodils.

Silver-gilt Grenfell Medal.

To W. F. M. Copeland, Esq., Shirley, Southampton, for new and rare Daffodils.

To Messrs. H. Chapman, Rye, for seedling and other Daffodils.

Silver-gilt Banksian Medal.

To Messrs. R. & G. Cuthbert, Southgate, for Hyacinths and Tulips.

Silver Flora Medal.

To Messrs. Bath, for Tulips and Daffodils.

Bronze Flora Medal.

To Major G. W. Churcher, Alverstoke, for Daffodils.

Award of Merit.

To Narcissus 'Honeycombe' (votes 10 for, 0 against), a handsome, double flowered, show variety; the outer segments cream-white, and the shorter, central ones, light-yellow, and frilled. From W. F. M. Copeland, Esq.

To Narcissus 'John Evelyn' (votes 12 for, 1 against), a shapely, exhibition flower of the *bicolor incomparabilis* class; perianth segments rounded and overlapping, crown deep-yellow, broad, frilled, and handsome, but often split. From W. F. M. Copeland, Esq.

NARCISSUS AND TULIP COMMITTEE, APRIL 13, 1920.

Mr. E. A. BOWLES in the Chair, and twenty-five members present.

The Peter Barr Memorial Cup was awarded by unanimous vote to Mr. Duncan Pearson, for the ensuing year, "for good work done in connexion with Daffodils."

The Engleheart Cup for new varieties was awarded to Dr. N. Y. Lower.

Awards Recommended :—

Gold Medal.

To Messrs. Barr, for Daffodils.

Silver-gilt Flora Medal.

To Messrs. Sutton, for Daffodils.

To the Donard Nursery Co., for Daffodils.

To Mrs. R. O. Backhouse, Hereford, for a small group of superb new Daffodils of wonderful colouring.

Silver-gilt Grenfell Medal.

To Mr. G. L. Wilson, for Daffodils.

Silver Grenfell Medal.

To Messrs. Jas. Carter, Raynes Park, for Tulips.

Silver Banksian Medal.

To Messrs. Bath, for Daffodils.

To Messrs. Pearson, Lowdham, for Daffodils.

Bronze Flora Medal.

To Messrs. Robt. Sydenham, Birmingham, for Daffodils.

Award of Merit.

To Narcissus 'Orange Glory' (votes 13 for, 0 against), a rich yellow, orange-tinted Trumpet Daffodil; flowers of medium size, graceful, and of a form suggesting that *N. cyclamineus* was an ancestor. From Messrs. Barr.

To Narcissus 'John Masefield' (votes 13 for, 0 against), a finely proportioned Poeticus variety, with pure-white perianth segments and bright-red crown. From Messrs. J. R. Peason & Sons.

To Narcissus 'Firetail' (votes 16 for, 0 against), a beautiful Poeticus variety, but distinct from most of this class in having sulphur-yellow perianth segments around the crimson-red crown. From Messrs. H. Chapman.

NARCISSUS AND TULIP COMMITTEE, APRIL 27, 1920.

Mr. E. A. BOWLES in the Chair, and eleven members present.

The following resolution, passed by the Council on April 13, was submitted for the guidance of the Committee: "Everyone who exhibits a flower, plant, fruit or vegetable, for award, shall be required to state whether he has raised it himself. If he is not the raiser, he shall give the name of the raiser in all cases where it is known."

Awards Recommended:—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Tulips.

Silver-gilt Banksian Medal.

To Messrs. A. Robinson, Bawtry, for Daffodils.

Silver Flora Medal.

To Messrs. Barr, for Tulips.

Silver Banksian Medal.

To Messrs. Geo. Bunyard, Maidstone, for Tulips.

Award of Merit.

To Tulip 'Advance' (votes 8 for, 0 against), a particularly large and fine seedling from *T. Gesneriana*; the flowers are of excellent form, clear scarlet, with a blue base, but with pink shading on the outer segments, which subdues its brilliance. From Mr. C. G. Van Tubergen, jun., Haarlem, Holland.

To Tulip 'Firenze' (votes 10 for, 0 against), a beautiful variety of the *T. stragulata* section; flowers of medium size, pointed, and of clear, soft orange colour. This variety is known also as 'Bowles' Orange,' and around Florence as *T. Buonarrotiana*, but the above is the correct name. From Mr. W. R. Dykes.

NARCISSUS AND TULIP COMMITTEE, MAY 11, 1920.

Mr. E. A. BOWLES in the Chair, and eleven members present.

Awards Recommended:—

Gold Medal.

To Messrs. Alex. Dickson, Belfast, for Tulips.

Silver-gilt Flora Medal.

To Messrs. Barr, for Tulips.

Silver Flora Medal.

To Messrs. Bath, for Tulips.

To Messrs. J. J. Grullemans, for Tulips.

Silver Banksian Medal.

To Messrs. Geo. Bunyard, for Tulips.

Award of Merit.

To Tulip 'Alcmene' (votes 8 for, 0 against), a distinct Tulip obtained by crossing a Darwin with a Cottage variety; flowers goblet-shaped, rich carmine crimson; base white, margined with opal blue. From Messrs. E. H. Krelage, Haarlem.

To Tulip 'Dido' (votes 7 for, 2 against), of similar origin to the preceding, but with elongated, longer flowers; the colour is rose carmine on a bronze ground, the latter colour covering the interior. From Messrs. E. H. Krelage.

NARCISSUS AND TULIP COMMITTEE, JUNE 1, 1921.

Mr. E. A. BOWLES in the Chair, and fourteen members present.

No exhibits were before the Committee on this occasion.

BOOKS PRESENTED, PURCHASED, OR REVIEWED DURING THE YEAR 1920, AND DEPOSITED IN THE LIBRARY.

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Abbreviations.—cor. = corrected; il. = illustrations; introd. = introduction; pl. = plates; col. pl. = coloured plates; frontis. = frontispiece; port. = portrait; enl. = enlarged; coloph. = colophon; pref. = preface; rev. = revised.

- ABBAY, R. Our orchards. Letters to the *East Anglian Daily Times*, 1892–1920, with notes. Ipswich [1920]. 8vo. (1)
 AIKIN, A. The natural history of the year; being an enlargement of Dr. Aikin's calendar of nature. 6th ed. . . . London, 1834. frontis. 16mo. (2)
 ANONYMOUS. A treatise upon the culture of peach trees. Translated from the French. London, 1768. 8vo. (3)
 — An essay on mineral, animal, and vegetable poisons; in which the symptoms, mode of treatment and tests of each particular poison . . . are concisely detailed. . . . 3rd ed. London, 1823. col. pl. 16mo. (2)
 — The calendar of garden operations, based on the original work compiled by the late Sir Joseph Paxton, for cottage gardeners, allotment holders, and amateur gardeners. New and enlarged edition by members of the staff of the *Gardeners' Chronicle*. London, 1920. il. 8vo. (1)
 — The orchard and the garden: containing certain necessarie, secret and ordinarie knowledges in grafting and gardening. Wherein are described sundry waies to graffe, and divers proper new plots for the garden. Gathered from the Dutch and French. Also to know the time and season, when it is good to sow and replant all manner of seedes. London, 1602. il. sm. 4to. (3)
 — Villa Pamphilia eiusque palatium cum suis prospectibus, statuæ, fontes, vivaria, theatra, areolæ, plantarum, viarumque ordines, cum eiusdem villæ absoluta delineatione. Romæ, n.d. pl. fol. (3)
 BABEY, C. M. P. Flora Jurassienne. . . . Paris, 1846. 4 vols. 8vo. (3)
 BAILEY, L. H. The nursery manual. A complete guide to the multiplication of plants. New ed. completely rev. and re-set. New York, 1920. il. pl. 8vo. (1)
 BELOW, P. De arboribus coniferis, resiniferis, aliis quoque nonnullis sempiterna fronde virentibus, cum earundem iconibus ad vivum expressis. . . . Parisiis, 1553. il. sm. 4to. (3)
 BLAKE, S. The compleat gardeners practice, directing the exact way of gardening. In three parts: The garden of pleasure, physical garden, kitchen garden. . . . London, 1664. pl. sm. 4to. (3)
 BOITARD. Traité de la composition et de l'ornement des jardins. . . . 3me ed. . . . Paris, 1825. 97 pl. obl. sm. 4to. (3)
 BOLTON, A. T. [Editor]. The gardens of Italy. With historical and descriptive notes by E. MARCH PHILLIPPS. London, 1919. il. col. frontis. fol. (1)
 BOYLE, J. G. Vegetable-growing. Philadelphia and New York, 1917. il. 8vo. (1)
 BREWER, G. W. S., and BREWER, M. D. The preservation of fruits and vegetables in the home. Cheltenham, 1920. pref. il. 8vo. (4)
 BRUNFELS, O. Kreuterbuch contrafeyt beide. Theil vollkommen nach rechter warer. Beschreibung der alten Lerer unnd ärtzt. Frankfurt a/M., 1546. il. fol. (3)

- BUCKINGHAM, E. B. *Camellia britannica* introduced by CHANDLER and BUCKINGHAM of Vauxhall. London, 1825. col. pl. 4to. (3)
- BUTLER, F. H. Through Lapland with skis and reindeer, with some account of ancient Lapland and the Murman coast. 3rd impression. London, 1919. pl. port. 8vo. (4)
- CANADA. Ontario Department of Agriculture. The fruits of Ontario, 1906. Toronto, 1907. il. 8vo. (5)
- CHARSLEY, F. A. The wild flowers around Melbourne. London, 1867. 13 col. pl. fol. (6)
- COLLINS, S. Paradise retriev'd: plainly and fully demonstrating the most beautiful, durable and beneficial method of managing and improving hedges, contrary to Mr. LAWRENCE and others upon gardening together with a treatise on mellons and cucumbers. London, 1717. pl. 8vo. (3)
- COOK, L. J. Perpetual carnations illustrated. An exhaustive guide to the cultivation of carnations. London, 1920. il. 8vo. (1)
- COOK, M. The manner of raising, ordering, and improving forest-trees: with directions how to plant, make, and keep woods, walks, avenues, lawns, hedges, &c. . . . 2nd ed. London, 1717. plans. frontis. 8vo. (3)
- COWLEY, H. Cultivation with movable frames. London, 1920. 8vo. (1)
- CRANSTON, J. Cultural directions for the rose, with full descriptions of all the finest varieties in cultivation, selections adapted to various circumstances and situations. . . . 2nd ed. London, 1863. pref. 8vo. (3)
- CROSBY, C. R., and LEONARD, M. D. Manual of vegetable-garden insects. New York, 1918. il. 8vo. (1)
- CRUICK, W. V. Home and farm food preservation. New York, 1918. il. 8vo. (1)
- DAVIS, K. C. School and home gardening. A text-book for young people, with plans, suggestions, and helps for teachers, club leaders and organizers. Philadelphia and London, 1918. il. frontis. 8vo. (1)
- Horticulture. A text-book for high schools and normals. Including plant-propagation; plant-breeding; gardening; orcharding; small fruit-growing; forestry; beautifying home grounds; the soils and enemies involved. Philadelphia and London, 1919. il. frontis. 8vo. (1)
- DE VRIES, H. Opera e periodicis collata. Utrecht, 1918-20. vols. 3-4. il. pl. col. pl. 8vo. (3)
- DE VRIES, JAN VREDEMAN. Hortorum viridariorumque elegantes et multiplicis formae, ad architectonicae artis normam affabre delineatae a Johanne Vredemanno Frisio. Antverpiae, 1583. pl. obl. 4to. (3)
- DE WILDEMAN, E. Mission forestière et agricole du Comte JACQUES DE BRIEY . . . au Mayumbe (Congo Belge). Documents mis en ordre et annotés par E. De W. Bruxelles, 1920. il. pl. 8vo. (4)
- DILLISTONE, G. The planning and planting of little gardens. With notes and criticism by L. WEAVER. London, 1920. il. plans. frontis. 8vo. (1)
- DYKE, W. The science and practice of manuring. . . . rev. and enl. ed. London [1919]. 12mo. (1)
- ELGIE, J. H. Elgie's weather book for the general reader. London, 1920. il. pl. 8vo. (1)
- ELLIS, E. T. Jottings of an allotment gardener. A book for all food-growers. 3rd ed. London, 1919. 8vo. (1)
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- ELLMORE, W. P. The cultivation of osiers and willows. Edited, with introduction by T. OKEY. London and Toronto, 1919. pl. frontis. 8vo. (3)
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- WATKINS & SIMPSON, Messrs., Covent Garden. Antirrhinums (see p. 357); Broccoli; Spinach; Turnips; Peas (see p. 382); Coreopsis; Cauliflowers.
- WEBB, Messrs., Stourbridge. Antirrhinums (see p. 357); Cauliflowers.
- WIGSTON, W. J., Ashted. Collection of seeds.
- WILKS, Rev. W., M.A., Shirley. Grafts of Apple 'Evargil'; *Dryas octopetala*; Rose 'Mermaid'; seed of small white Passion flower; *Ajuga reptans purpurea alba*; *Orchis praetermissa*; seed *Anemone sulphurea*; seed Shirley Poppies and Shirley Foxgloves (for distribution 1921); seed *Cistus laurifolius* × *C. purpureus*; *Polypodium calcareum*; *Lastrea dilatata*; seed *Pyrola rotundifolia*; seed *Papaver pilosum*.

cviii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

- WILLIAMS, J. C., Gorran R.S.O. Rhododendrons ; seed *Magnolia Wilsonii*.
WILMOTT, Rev. R. H., Worcester. Primulas.
WINN, G. H., Duffield. Sweet Pea 'Mrs. George Winn.' Included in trial.
WOODCOCK, F. C., Walmer. Sweet Peas. Included in trial.
WOODWARD, C., Wolverhampton. Broccoli.
WOODWARD, Mrs., Colchester. Grafts of Apple 'Nolan Pippin.'
WYBURN, Miss, Barnet. Seeds from Australia and China.

NATIONAL DIPLOMA EXAMINATION, 1920.

THE Examiners report that the candidates who passed the examinations reached a very fair standard of excellence and in some cases a high one. Too many, however, of those who entered failed to appreciate the importance of attention to details and of thorough familiarity with the matters with which they may be called upon to deal; while others, even though familiar with principles of good practice, failed to apply them when confronted with new conditions.

In the main, the outdoor work was satisfactory, but many showed small acquaintance with the technique of grafting, and the knowledge of summer pruning was distinctly poor; even so common and essential an operation as staking was done in an unsatisfactory fashion by many, who either tied the plants so as to make them lose their natural habit, or used stakes far too heavy and conspicuous for the purpose.

In the work at the potting bench, again, inattention to such elementary points as the thorough mixing of the ingredients of a potting compost, the proper choice of pots, firm planting, and so on, was too often apparent.

Candidates for this, the premier Horticultural Examination, should realize that the standard set is one commensurate with the idea that the possession of the National Diploma in Horticulture should be the hallmark of the best practitioners of the horticultural profession. While its attainment is not beyond the power of any who will devote attention not only to gaining a knowledge of the principles of horticulture, but also to acquiring technical skill in applying them practically, it is not to be acquired lightly or without due and prolonged preparation. Reading alone, no matter how painstaking, nor practice alone in one or two sets of conditions, is sufficient preparation. A broad and deep knowledge of principles and a close acquaintance with details of practice, together with the power of carrying them out in a craftsmanlike manner, are all called for. If candidates will realize this there will be a smaller proportion of failures and the future of horticultural progress will be assured.

The following candidates secured the Diploma :

Section 1.—General Horticulture.

Abbis, H. W., 1 Richmond Road, Exeter.
Dedman, J. M., 109 New Barn Lane, Rochdale.
Herring, Miss L. K., Horticultural College, Swanley, Kent.
Hudson, C. E., East Anglian Institute of Agriculture, Chelmsford.
Jones, Miss D. R., West Heath, Ham Common, nr. Richmond, Surrey.

Section 8.—Horticultural Teaching.

Kent, W. G., County Education Office, Kingston-on-Thames.
Perry, P. B., Horticultural Department, Holmes Farm, Kilmarnock, N.B.
Simmonds, A., 66 Old Tovil Road, Maidstone, Kent.

The following have passed the Preliminary Examination, and are eligible to take the Final Examination following their required six years' experience in gardening :

Channing, S. J., Norton Manor Gardens, Sutton Scotney, Hants.
Christian, W. H., Piel View, Public Park, Barrow-in-Furness.
Gethen, H., Mondamin, West Mersea, Essex.
Hemming, Miss M. H., Studley College, Studley R.S.O., Warwickshire.
Jarrett, J., Bradford, Victoria Avenue, Wellington, Salop.
Millar, Miss L. L., Heatherdown, Hythe, Hants.
Morgan, L. E., Queen's Park, Victoria Avenue, Crewe.
Rudge, A. T., Spread Eagle Hotel, Gailey, nr. Stafford.
Syer, Miss K. L., Charlton, East Sutton, Maidstone, Kent.
Townsend, F. G., Bradwell Training School, Holmes Chapel, Cheshire.
Tuck, W. H., The Homestead, Stoke Ferry, Norfolk.
Wilson, G. F., R.H.S. Laboratory, Wisley, Ripley, Surrey.

W. R. DYKES, *Secretary.*

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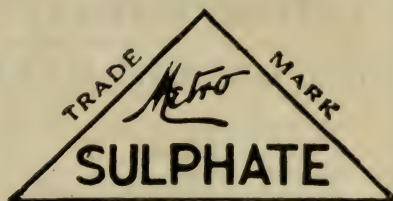
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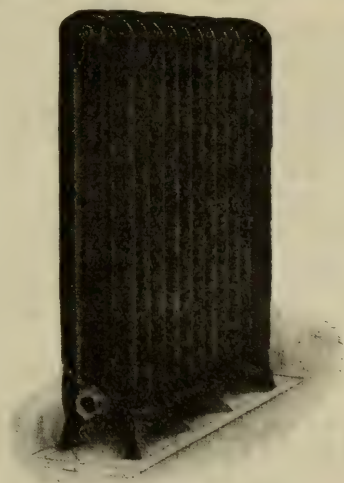
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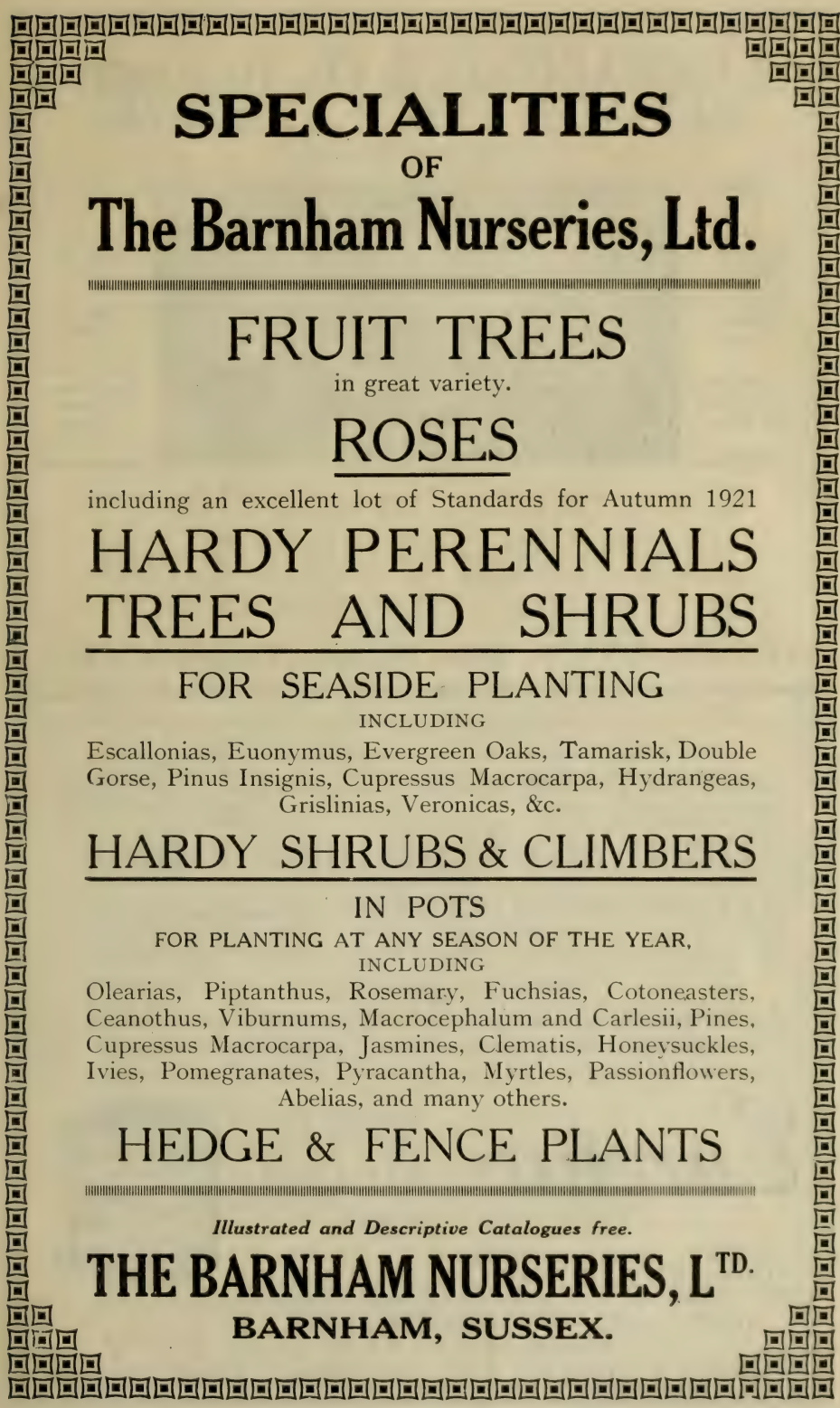
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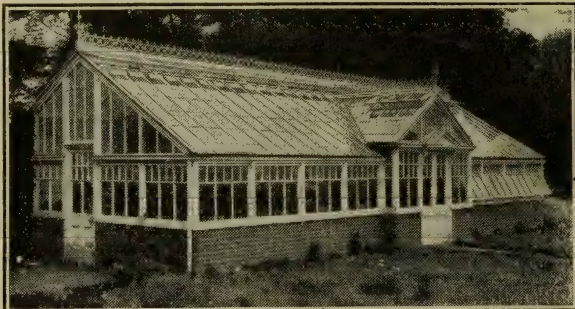
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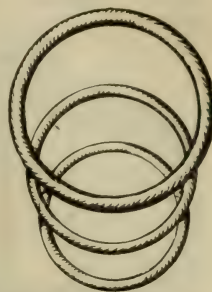
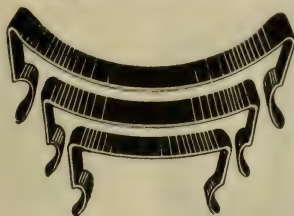
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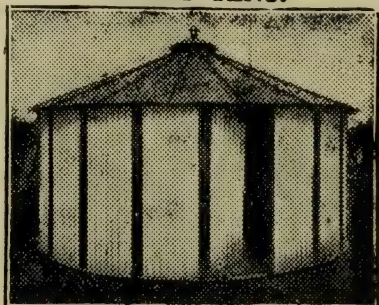
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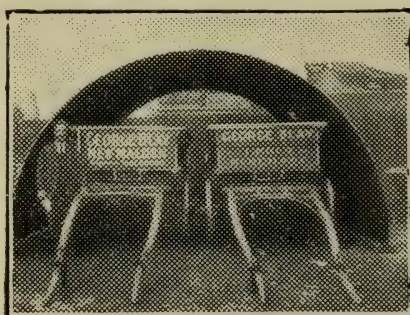
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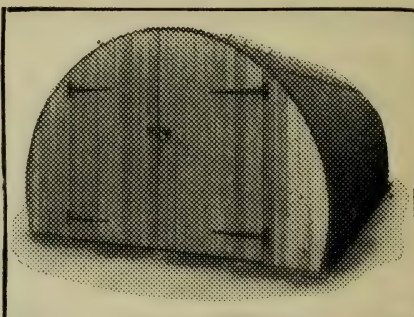
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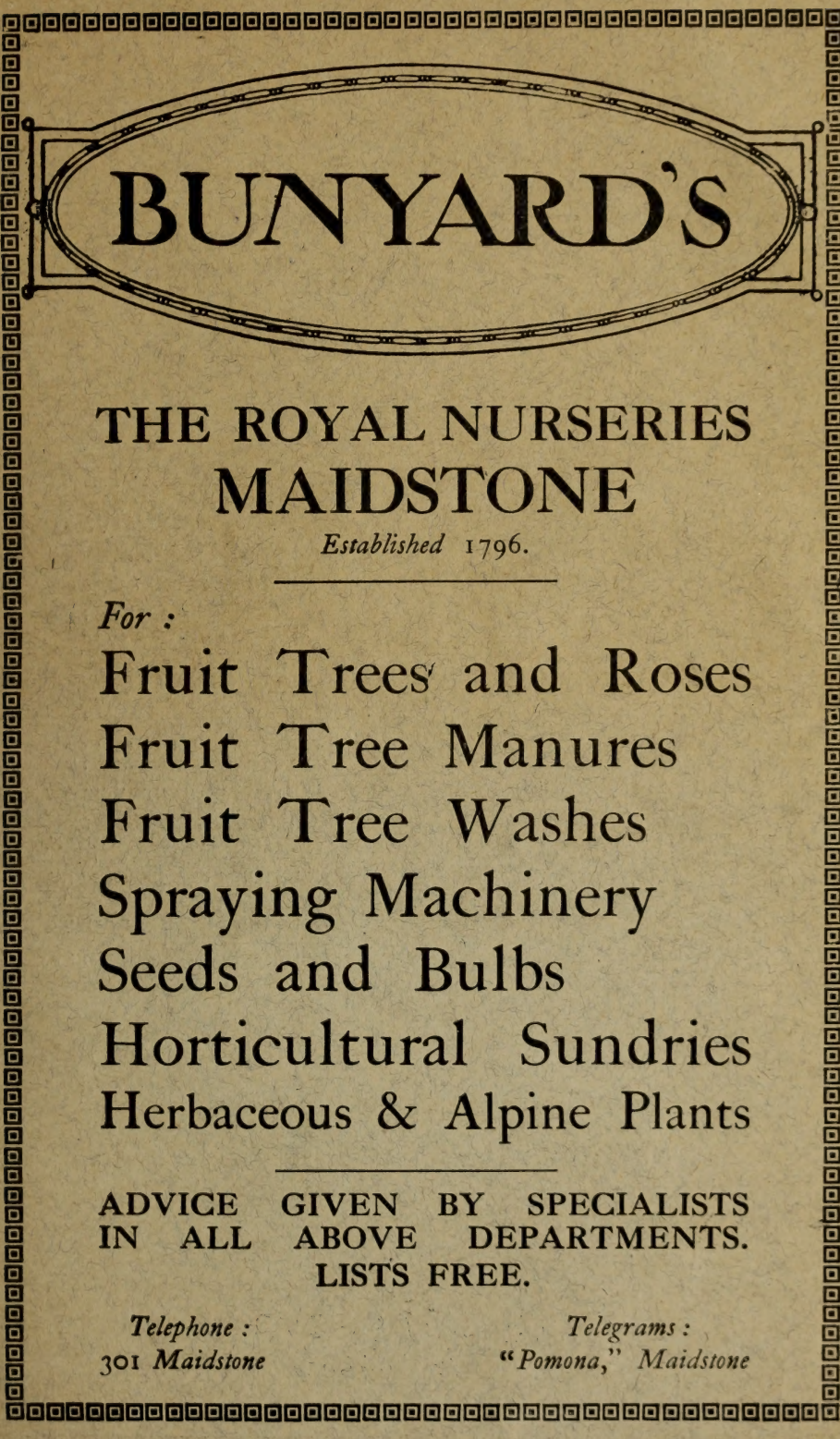
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